UNIVERSITY OF KWAZULU-NATAL

INTRODUCING ADVANCES IN NON-TOXIC INTAGLIO PRINTMAKING AT THE CENTRE FOR VISUAL ARTS UKZN THROUGH PRACTICE BASED RESEARCH

By

Casparus Eloff Pretorius

212535538

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College of Humanities, School of Arts: Centre for Visual Art,

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Supervisor: Doctor Kathy Arbuckle

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DECLARATION

I Casparus Eloff Pretorius declare that

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Abstract:

This study investigated the reduction of hazards in intaglio printmaking through practice-based research of non-toxic etching and intaglio materials. Traditional etching techniques involve health, safety, and environmental hazards that can be minimised by using alternative non-toxic materials and processes. This study investigated the potential of using non-toxic intaglio printmaking methods in place of traditional methods at the Centre for Visual Arts (CVA) at the University of KwaZulu-Natal (UKZN).

A review of literature on non-toxic intaglio printmaking revealed a gap in non-toxic research specific to the South African context. A case study of a Belgian non-toxic printmaking studio was conducted over a period of three months, which enabled practical non-toxic printmaking experience to be compared with traditional printmaking methods. Qualitative data was collected through artistic practice, observation, interview, and collection of artefacts. The non-toxic alternatives were found to be capable of achieving the visual effects generally associated with traditional etching methods and materials, while reducing the number and variety of hazardous materials present in the printmaking studio. General Systems Theory was used to analyse the ‘parts' which comprise the ‘whole’ etching system. The processes and materials used in etching were studied as parts with interrelations that are used as a means of artistic production. By isolating these parts and systematically testing alternatives, a non-toxic etching method was developed for the CVA.

This practice-based research process resulted in a series of printed artworks. These works explored relevant themes including toxicity, disruption, the overview effect, and the impact of human activity on the earth system. The works incorporated traditional and high-altitude perspectives of mining waste sites which were identified as disrupted South African landscapes. In these landscapes, toxic chemical waste and extractive mining activities had changed the environment dramatically. The disruption of the landscapes depicted in the printed works is a thematic extension of the disruption of traditional printmaking methods through the introduction of non-toxic methods. This disruption improved safety by reducing chemical hazards in intaglio printmaking practice, and contributes to making this mode of artistic practice more sustainable.

Glossary of Acronyms:

Centre for Visual Arts - CVA
University of KwaZulu-Natal - UKZN
Ferric Chloride - FeCl
Occupational exposure limits - OEL
Material safety data sheet - MSDS
Baldwin Intaglio Ground - BIG
Vegetable cleaning agent - VCA
Ultra violet light - UV

Definitions of Key Terms:

Acrylic ground - A polymer-based ground that hardens through polymerisation when it dries, can be drawn through, and can withstand the action of a mordant.
Airbrush aquatint - Aquatint tones achieved through the application of fine mordant-resistant acrylic particles across the matrix using an airbrush.
Aquatint - Tones achieved by covering the matrix with a dusting of mordant-resistant particles, evenly distributed across the plate, that create a network of islands and recesses when etched.
Bite - The processes of submerging the plate in a mordant.
Burr - The protrusion of displaced metal created by drypoint mark making.
Drypoint - The process of scratching the matrix surface by hand using a sharp tool, which creates a protrusion and a recess in the surface of the matrix.
Engraving - The process of cutting recesses into the surface of the matrix by hand using a 'V' shaped engraving tool called a burin.
Etching - The process of creating recesses in the surface of the matrix through the action of a corrosive chemical.
Hard ground - A wax-based substance that contains bitumen and rosin. It withstands the action of a mordant and can be heated and applied to the matrix in a thin layer that hardens when it cools and can be drawn through easily using an etching needle.
Heatsetting - A textile industry term for the processes of hardening an ink by heating it.
Intaglio - The subcategory of printmaking where the ink applied to the substrate sits in recessed areas beneath the original surface of the matrix.
Metal salt etchant - Non-acid mordants including ferric chloride and copper sulphate.
Mordant - A liquid chemical substance that corrodes the surface of the matrix and creates recesses.

Non etch intaglio-type - A printmaking process developed by Keith Howard, which uses a photopolymer film as the matrix.

Non-toxic printmaking - Printmaking practice that replaces hazardous materials traditionally used in printmaking processes with safer materials.

Plate - The metal matrix used for etching or engraving.

Practice - The processes of artistic production by the artist.

Printmaking - The process of making images by transferring them from specially-prepared matrices (like metal plates or wooden blocks) to a receptive substrate (normally paper).

Soft ground - A wax-based substance that contains bitumen, rosin, and animal fat. It withstands the action of a mordant and can be applied to the matrix in a thin layer when heated but remains soft when cool.

Traditional etching aesthetics - The visual effects associated with the etchings of master printmakers since the 16th century, including the quality and density of fine line, free mark making, and rich tonal range.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Improving a well established system like etching or intaglio printmaking is a challenging task. It requires a systematic disrupting of the whole system, so that the parts which comprise that system can be evaluated and replaced without impacting the results. When the system in question has strong ties to tradition, history and the arts, its value is not only in the results of the system, but also in the process and the experience of those interacting with the system. In the context of etching, this valued tradition connects the medium and the artist to old master printmakers, the history of the printed image, and the materials through which those images are created. In contemporary etching many of the same materials that were used by the old masters are used so that the same visual characteristics can be created. This connection to history has resulted in etching remaining a medium used by practicing artists and taught at art institutions such as the Centre for Visual Art.

Traditional printmaking techniques involve health, safety, and environmental hazards that can be avoided. Etching is a medium that uses a number of chemicals, including strong acids and solvents, which pose a potential risk to artists and students working in this discipline. In addition, these materials, when disposed of improperly, can pose an environmental hazard. Furthermore copper used in etching is mined through environmentally destructive processes. This study explores hazards in the arts by investigating advances in non-toxic intaglio printmaking. An increasing number of practicing artists have developed new working methods that are less dependant on hazardous materials and create safer working environments. Marnix Everaert, a printmaking professor in Ghent, Belgium stated in an interview for this research that in printmaking “You must be sceptical. You must always think, ‘is this actually better than the other thing?’”. Over the last three decades, artists and printmakers like Everaert have developed new printmaking methods that are safer to use and deliver the same visual characteristics associated with traditional etching and intaglio methods.

This study investigated the potential of using non-toxic intaglio printmaking methods in place of traditional methods at the Centre for Visual Arts (CVA) at the University of KwaZulu-Natal (UKZN). A review of literature on non-toxic intaglio printmaking revealed a gap in non-toxic research specific to the South African context. A case study of a Belgian non-toxic printmaking studio conducted over a period of three months enabled practical experience of non-toxic printmaking to be compared with traditional printmaking methods. Following this case study, the lessons learnt in Belgium could be tested at the CVA, thus

allowing for an assessment of non-toxic intaglio printmaking potential within the South African context. This comparison of traditional and non-toxic intaglio printmaking led to the generation of a series of recommendations for creating safer practices at the CVA. The artworks generated through this research can be viewed in the catalogue for the exhibition titled *Disruption* in Appendix B.

1.2 Background to the study

Intaglio printmaking dates back to the 14th century and remains a common practice in art institutions and schools around the world. The 600-year-old tradition began with engraving, which enabled skilled draughtsmen to draw with needle-fine precision and print multiple original artworks. Intaglio was perfected by printmakers like Rembrandt Harmenszoon Van Rijn (1606-1669) and Francisco de Goya Lucientes (1746-1828), whose engravings, etchings and aquatints demonstrated precision and control over fine lines and tones to create powerful images. Unlike engraving, which relied on the metalworking skill of the draughtsmen, etching allowed the artist to draw directly onto the plate with loose gestures. The labour of removing metal from the plate surface was done by the corrosive action of the mordant. Thus, the marks of the needle only had to break through the wax-based ground and expose the metal plate underneath. The artist's gestures could be recorded in extremely fine detail and then etched for different durations to create a variety of tones. An image like Rembrandt's 'L'Ecce Homo' (1630) seen in Figure 1.1, shows the variety of tones and textures that can be achieved with hard ground etching. The density of line is so well executed and controlled that it blends together in some places to appear as a single tone; in other places, the loose gestural mark gently renders facial expressions; and in yet another section, chaotic expressive lines darken the sky and create a sense of imminent tragedy.

Figure 1.1 Rembrandt Van Rijn, *L'Ecce Homo* (1630)
Etching, UKZN Collection

Goya, having lived through the Napoleonic rule of Spain, in his later years documented the horrors and cruelty that he had witnessed at the hands of the French, the Spanish and the church, creating images as grotesque as they are beautiful (Faure, 1937). His series, *The Caprices*, reference architectural fantasy landscape paintings and "lashes out at human follies and vices as deviations from the path of reason, justice and enlightenment" (Anwer 1985, p. 45). His etchings and aquatints were loose and gestural, taking on a populist nature both in the use of the print as a medium, and through his use of 'common wisdom' in his subject matter. Goya printed large editions of *The Caprices* until they were brought to the attention of the Inquisition (Schultz 2005, p. 81). Goya realised the political power of his printed images when their large number prevented them from being destroyed by the Inquisition's censors. The print medium made his message difficult to contain and ensured that it would reach a wide audience eventually. This is evident as the UKZN collection includes a first edition print from *The Capricesi.* This print, shown in Figure 1.2 and titled 'No One Has Seen Us', is number 79 in the series and depicts a group of religious leaders drinking under the shadow of an ominous witch-like figure.

Figure 1.2 Francisco De Goya, *No One Has Seen Us* (1799) Los Caprichos plate 79. Etching and aquatint, UKZN Collection

1.2 Printmaking in South Africa

The European printmaking technologies and traditions discussed above were brought to South Africa by colonial Europeans in the early 20th century. Printmaking infrastructure and expertise were only accessible within academic art institutions that taught a European model of art education and were only accessible to white students during the apartheid era (Hobbs 1997, 8). It was through the work of Peder and Ulla Gowenuis and Otto Lundbohm at the Evangelical Lutheran Church Art and Craft Centre in Rorke's Drift that black South African students first gained access to printmaking. Artists who worked at the centre in Rorke's Drift were provided with materials and basic technical instructions and then worked independently without further formal training (Hobbs 1997, 14).

A number of South African artists including Cyprian Shilakoe, Azaria Mbatha and John Muafangejo worked and taught at the centre at Rorke's Drift. The artists had no formal academic training or art education and were able to create highly successful art works. Peder Gowenuis notes that "Such revelations made [him] wonder if the 'Western' school system based on knowledge was not inhibitory to creative expression." (Hobbs 2003, XII). This notion became a cornerstone of the centre at Rorke's Drift, allowing African artists to access the 'Western' traditions of printmaking, without adopting a 'Western' approach to academic

art discipline. These artists undermined the academic traditions of colonial school systems and created African art in a European medium without adopting a European aesthetic style.

Figure 1.3 Cyprian Mpho Shilakoe, *The Survivors* (1969)
Etching and aquatint, Tatham Art Gallery

Shilakoe's *The Survivors* (1969), seen in Figure 1.3, illustrates an expressive strength through a mastery of aquatint which the artist uses to achieve an atmospheric quality. His emotionally charged images deal directly with the suffering of black people in South Africa. Many of his plates '…conjure up the marginal lives of individuals who lack the security of belonging, as do their ghostly presences amid the evocative aquatints of his etching plates' (Hobbs 2003, 196).

Gowenuis notes the egalitarian nature of printmaking stating that "the multiplicity of the print challenges the notion of the unique object…" (Hobbs 2003, 161), making prints more affordable to buyers, without sacrificing their status as a fine art object. Printmaking provided a medium for self-expression and economic empowerment. Okui Enwezor further elaborates on this in his article *Neglected Artform or Poor Relation:? The Importance of Printmaking in Africa* (1997) noting: "when pictures shed their aura of the essential object, they are reformed in ways which allow their re-presentation to a wider public… Thus what manifests itself as important is the information communicated through the media exchange

system rather than the authenticity of the physical object." (Döring, 2002 citing Enwezor in Geers 1997).

The prints created by black South African artists during this period had a political potency because of the nature and history of the print medium. These artists were able to use European printmaking techniques to share their narratives with a local and international audience through powerful and expressive printed works. Within the contemporary context of decolonising education in South Africa, artists like Shilakoe demonstrate a utilisation of European mediums and technologies to further an African historical narrative.

Today, intaglio printmaking is taught at many tertiary art institutions and practiced at several private art studios around South Africa. The art form's capacity for fine draftsmanship and tonal variation, and its connection to political activism make it an attractive medium for artists working in South Africa. The aesthetics of printed works like these have defined intaglio printmaking practice for centuries and make up an important chapter in the history and political power of the printed image.

The CVA has a printmaking department where intaglio, relief, and screen print methods are taught. I received my Bachelor of Arts at the CVA in 2015 and then went on the complete my Honour's degree in printmaking in 2016. The intaglio curriculum at the CVA from 2012 through to 2016 taught etching using the traditional materials and processes. In 2016, I attended a workshop with other students and staff from the CVA at the Caversham Press, where we were introduced to Professor Marnix Everaert and non-toxic intaglio printmaking.

At the workshop, Everaert demonstrated non-toxic alternatives to traditional intaglio materials. One alternative was acrylic resist etching, which replaced the traditional bitumen and wax-based hard ground with an acrylic hard ground. This substitution removed the solvents required for cleaning the hard ground and bitumen off the plate and introduced a non-toxic paint stripper for removing the acrylic ground. Instead of the traditional hydrochloric acid mordant, ferric chloride was used, and airbrush aquatint replaced the traditional rosin dust method. Following this workshop, the CVA included ferric chloride as the primary mordant for etching copper plates, but other aspects of non-toxic printmaking proved too challenging to properly adopt without further research.

1.3 Rationale

In order to improve the system of printmaking processes at the CVA, a thorough investigation of all the parts which make up that system was conducted. The process of

disrupting the CVA intaglio printmaking system was necessary to improve safety. This study came about to fill the gap in knowledge of processes and materials that would allow printmaking students at the CVA to work with non-toxic intaglio. The gap in knowledge was filled by spending three months at the Academy for Visual Arts in Ghent, Belgium, where I was able to work alongside Marnix Everaert and conduct an ethnographic case study of the printmaking practices and culture at the Academy in Ghent.

The etchings produced through this research explored the visual effects of various alternative non-toxic techniques. The subject matter of the works explored the scarring of landscapes in South Africa by the extractive mining industry and other environmentally destructive human activities. Copper plate etching is intrinsically connected to the mining industry. The Rio Tinto Copper Mine in Palaborwa (Figure 1.4) is the widest 'man-made' hole in Africa with a diameter of 1900 meters across (Maloma, 2017). The prints created with non-toxic processes point to the continued abuse of the South African landscape through extractive industry and mining waste. The aesthetic of damaged environments is explored in practice by referencing satellite photographs of damaged, toxic, or mined landscapes and creating intersections with traditional first-person landscape perspectives.

The aim of this study was to improve safety by finding alternatives to traditional materials while also preserving the traditional aesthetics of intaglio printmaking. The key research objective of this study was to introduce non-toxic materials at the CVA and create a series of etchings using these materials.

Figure 1.4 Rio Tinto Copper Mine in Palaborwa, Google (2018)

The key questions that this study sought to answer were:

- What is the nature of non-toxic printmaking practice at the Academy For Visual Art in Ghent?
- What is the nature of traditional printmaking practices at the Centre for Visual Art at UKZN?
- How do the practices at these two studios compare?
- What aspects of non-toxic printmaking can be applied at the CVA?
- How can these printmaking practices be used in exploring landscape features as an indicator of environmental degradation in South Africa?

The specific objectives of this research were:

- To study and record non-toxic printmaking practice at the Academy for Visual Art in Ghent.
- To compile a series of non-toxic intaglio printmaking recommendations for the CVA.
- To create a body of printed works using non-toxic materials and processes.

1.4 Summary of chapters

This dissertation has been divided into eight chapters.

- Chapter 1 introduces the research by describing the background of the study, establishing an understanding of traditional etching and presenting the aims and objectives of the study.
- Chapter 2 contextualises the study by reviewing relevant literature on non-toxic intaglio methods and establishing a theoretical framework based on General Systems Theory. This is followed by a discussion of artists and artworks whose practice and /or thematic concerns have influenced my own work.
- Chapter 3 details the research paradigm and methodologies used in this study including practice based research, case study and ethnography.
- Chapter 4 presents the case study of the Academy for Visual Arts in Belgium. It includes an interview, observations of studio practices, and descriptions of the various non-toxic materials, processes and infrastructure.
- Chapter 5 discusses printmaking practices at the CVA and makes a series of recommendations that would improve studio safety, based on the findings in Chapter 4.
- Chapter 6 analyses and discusses the artworks produced through this research. The discussion unpacks the materials and processes used, as well as the thematic concerns present in the subject matter.

- Chapter 7 summarises the findings of the research with reference to the aims and objectives.

A catalogue of the artworks produced through this research and exhibited at the *Disruption* exhibition is presented in Appendix B.

1.5 Conclusion

This research investigates non-toxic intaglio printmaking methods as a safer alternative to traditional materials, and the potential of using these methods at the CVA. The research was conducted through practice based research that produced data in the form of printed artworks and detailed descriptions of etching methods. The printed works illustrate the visual characteristics of the non-toxic methods under study and explored series of thematic concerns related to the theoretical framework of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Non-toxic intaglio printmaking

This chapter contextualises the research by reviewing relevant literature and artworks and establishing a theoretical framework. The review of literature examines research relating to non-toxic printmaking and safety in the printmaking studio and identifies alternative materials and working methods. The theoretical framework discusses relevant theories that have guided this research. This chapter concludes with a discussion of the work of contemporary artists that resonate with my thematic concerns.

In recent years artists have developed an interest in creating safer working environments by re-evaluating the materials and the processes through which artworks are created. In this section I will discuss some of the developments in contemporary etching practice and how these developments have introduced safer alternatives to traditional materials while retaining the valued aesthetics of traditional printmaking described in the introduction.

In the field of printmaking, artists Keith Howard, Friedhard Kiekeben, and Jon Pengelly, amongst others, have thoroughly researched the hazards of 'traditional' etching materials and processes. These processes were based on the corrosive action of acid eroding the exposed areas on a metal plate covered with a thin layer of wax ground or bitumen. These processes make use of dangerous materials, and their continued use in many contemporary printmaking studios may be an unnecessary risk to artists and students alike.

In his 1998 book, *Non-Toxic Intaglio Printmaking*, Keith Howard presents an extensive guide on setting up a non-toxic intaglio studio. This volume includes Howard's research about acrylic resist etching, intaglio-type techniques, and the development of the Edinburgh Etch by Friedhard Kiekeben. The book is a thorough manual for artists and printmakers seeking to reduce the risk of working in a printmaking studio. However, many of the materials listed in his book are only available in northern America, and some products have changed significantly since the book was written. Howard's recipes for materials rely on industrially-produced cleaning agents, and some small changes to the contents of these materials over the years have made the results unreliable. Artists using this book as a guide have to find current equivalents of some materials. The book also introduces photopolymer film as a new resource, which allows artists to create photo-exposed intaglio plates with a photosensitive polymer film. Contemporary digital image processing software has simplified Howard's digital processes significantly.

In the book's introduction Keith Howard mentions that his interest in non-toxic printmaking started after he developed serious health issues, which his doctors attributed to the toxic fumes that he had been exposed to through his printmaking practice (Howard, 1998). Howard's research into safer practice was met with support from other printmakers looking for alternative materials, and his book is a collaborative project that includes research and some writing by artists like Friedhard Kiekeben of the Edinburgh Printmakers Workshop, Elizabeth Dove, Mark Zaffron and George Roberts, amongst others. The collaborative nature of this book is indicative of the type of community that has formed around safer printmaking methodology. This community is now well-represented by the online platform www.nontoxicprint.com, which is an academic research website on non-toxic art practices and health in the arts.

In his forward to Howard's 2003 book, *The Contemporary Printmaker*, Friedhard Kiekeben states that while "the publication of books, magazine articles and websites are all-important… nothing is as persuasive as the practical knowledge gained from hands-on demonstrations and teaching sessions" (Howard 2003 p. 1). This was true in my research, as the literature was often context-specific and many of the processes involved in printmaking are difficult to describe without practical demonstrations. The online resource www.nontoxicprint.com offers extensive reports and papers written by printmakers and researchers "dedicated to specialised and science-based health and safety topics and experience and advice from the medical field" (www.nontoxicprint.com).

2.2 Safety awareness in printmaking

Printmaking represents an interesting intersection between chemistry and art. Artists and students with no background in chemistry or science are placed in an environment where the hazardous materials are often not properly understood. In a scientific setting, such as a university laboratory, the focus is on the chemistry of the materials and there is an increased awareness of safety. In *Non-Toxic Intaglio Printmaking* (1998), Monona Rossol refers back to her time working as a research chemist at the University of Wisconsin while completing her master's degree in fine art. She observed that while the chemicals used by both departments were the same, their approach to safety differed significantly.

> *In the Chemistry Department, students were not allowed to enter the laboratory until they had taken the safety orientation and had their certificate. In the Art Department students had no formal safety training. Worse there was a pervasive attitude among teachers and students alike that risk-taking was an inevitable and exciting part of art making.* (Rossol, in Howard, 1998).

In a 2004 study by Bassam Naser Radaydeha and Sameer Abd-Alkareem Otoom at the Yarmouk University in Irbid-Jordan, researchers sent out a survey to compare whether students attending programmes teaching traditional printmaking methods and students attending printmaking programs teaching non-toxic methods had a different awareness of the health and safety concerns associated with printmaking. Their study was influenced by the 1713 publication, *The Diseases of Workers,* by Bernardo Ramazzini and the patterns of disease that Ramazzini discovered in the artistic community. According to Radaydeha and Otoom, medical historians have concluded that several of the old masters suffered from severe disease because of the materials they worked with. For example,

> *Peter Paul Rubens (1577–1640), Pierre-Auguste Renoir (1841–1919), and Raoul Dufy (1877–1953) are other historical examples of health problems associated with art materials. All suffered from crippling arthritis; and all were known to use pigments from toxic metals such as antimony, arsenic, cadmium, cobalt, chromium, lead, manganese, and mercury.* (Radaydeh & Otoom, 2004 p. 570)

The study asks a series of questions about studio safety, materials and frequency of use. The questionnaire was sent to 130 students working at traditional studios and 130 students working in non-toxic studios. Their findings showed that "printmaking students in both non-toxic and traditional printmaking programs were moderately aware of the toxic nature of printmaking materials, but further analysis... showed non-toxic printmaking students were more aware than traditional printmaking students" (Radaydeh & Otoom, 2004 p. 570). Their observations reveal a need for increased awareness, especially in traditional studios where the risks are far higher.

In his PhD thesis, *Environmentally Sensitive Printmaking, a Framework for Safe Practice,* Pengelly (1997) investigates the safety of the printmaking environment and the role of artists working in this environment. According to his research, artists often accept the risk of working with hazardous materials if that risk results in "creative merits" (Pengelly, 1997 p. 39). He goes on to conclude that "individual artists are willing to accept surprisingly high levels of risk in relation to their creative practice… provided the risks are self imposed and that the consequences lie many years ahead" (Pengelly, 1997 p. 41). Risk can be defined as the frequency of occurrence, multiplied by the severity of contact. So, the presence of solvents may have a low risk factor when used once or twice to clean the ink off a plate, but if this process is repeated over and over for years by the same artist, the risk of health and safety problems manifesting will increase.

When confronted with the reality of this risk factor, an artist must decide whether or not these materials are worth using. This decision is personal if the risks are self-imposed, as Pengelly points out (Pengelly, 1997 p.41). I would make the argument that in an educational institution, such as a university art department, the option to work with non-toxic materials should be made available to students who are interested in printmaking. Without this alternative, students with an interest in printmaking are not able to manage their own "risk-satisfaction balance" (Ashby in Pengelly, 1997 p. 41).

Research into non-toxic printmaking with a focus on the health and safety of printmakers has developed quickly in recent decades through books, articles, websites and workshops. The non-toxic community has worked hard to make information accessible so as to provide printmakers with effective alternatives to traditional methods. This wealth of material establishes a firm foundation for any printmaker interested in working with non-toxic printmaking. In South Africa, there is a need for acrylic hard ground, soft ground, and aquatint mediums to be developed or discovered. A safer studio with safer materials will benefit the artists as well as the art form.

2.3.1 Theoretical framework

The primary theory that informs this study is General Systems Theory. General Systems Theory "consists of the scientific exploration of 'wholes' and 'wholeness'" (Bertalanfy, 1978 p. 415) by seeking to understand the parts that make up the whole and the interrelations between them. Bertalanfy defines a system as "a set of elements standing in interrelation among themselves and with the environment" (Bertalanfy, 1978 p. 417). Two sub-categories of systems are described: open systems where the internal elements of the system can interact with each other and with the environment and closed systems, where the internal elements are isolated from the environment. The printmaking studio is an open system where the artist interacts with the internal elements. The studio system is constantly affected by external environmental factors, such as air temperature and humidity, which can influence the interaction of the internal elements. In the printmaking studio system, artists generate images by engaging a series of facilities, processes, and materials. Each of these printmaking systems is comprised of processes and materials that deliver predictable visual results, which the artists use to create unique printed works. Most intaglio processes rely on the predictability and consistency of visual results as they allow the artists to control their image creation processes and print accurate editions.

Changing a system like a printmaking studio requires an understanding of each material and the process through which that material is used, as well as the relationships between those

separate materials and processes. “In order to understand an organised ‘whole’ we must know both the parts and the relations between them” (Bertalanfy, 1978 p. 411). Once the materials and processes are understood, the researcher can begin a process of substitution and testing where alternative materials are evaluated. In the context of this research, the new materials introduced into the printmaking system were chosen to improve safety in the studio. The visual outputs that these new materials produce were evaluated according to the consistency and predictability with which they can replicate the aesthetic characteristics of the traditional materials. This approach to analysing the printmaking system allowed the researcher to identify elements in the printmaking system that can be replaced without reducing the quality of the system’s outputs.

This study is informed by Jon Pengelly’s application of General Systems Theory in establishing a framework for safe printmaking practice. Pengelly states that the “relevance of the systems model to [his] research directly relates to the procedural nature of printmaking practice” and that “systems thinking establishes that problems are solved through the learning process, rather than through any replacement of current reality with abstract theory” (Pengelly, 1997 p. 78). The product of his research was a theoretical analysis of the materials, as well as a body of printed works, which illustrated the visual applications of these materials. This is a practice-based research approach, where practice is generated through the research process and the resulting research exists both as theory and art. According to Linda Candy, ‘Practice Based Research is an original investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice’ (Candy, 2006 p. 3). Pengelly’s research created a ‘morphological framework’ for safe practice “to establish a procedure which implicitly links every action and selection made by the printmaker, to an informed comprehension of the occupational health and safety implications associated with that decision” (Pengelly, 1997 p. 146).

Wharton defines risk as the frequency of contact multiplied by the severity of the consequences (Wharton, 1992 in Pengelly, 1997 p.37). In the context of a printmaking studio artists working with traditional toxic materials can quickly find themselves operating outside of the Occupational Exposure Limits (OEL) set by South Africa’s Department of Labour. Several of the chemicals used in traditional printmaking, like concentrated acids and hydrocarbon solvents, including mineral turpentine spirits, have strict limits set for recommended exposure times because of the harmful side effects that these chemicals can cause (Labour.gov.za, 1995).

Artists may not always be aware of the cumulative danger of hazardous materials when there is frequent contact over a long period of time. Some experts have suggested that Francisco

De Goya's severe health problems were linked to his use of toxic materials in his art work. The lead used in his pigments are believed to be the amongst the causes of his mental and physical illness. Goya's health began to decline in 1792 and his work became increasingly morbid and fantastical as his condition worsened (Felisati and Sperati, 2010 p. 268). Artists will accept high levels of risk, provided that the risks are self-imposed and the consequences are not immediate (Pengelly, 1997 p. 41).

For students at the CVA, these risks may not be self-imposed, as the materials are provided by the department. If the art department does not offer students an alternative option then students are being required to accept these health risks in order to pass the academic criteria. According to Michael McCann, "Art teachers are responsible not only for their own health, but also for safeguarding the health of their students" (McCann, 1992 p.140). Substituting traditional materials with safer options reduces hazards in the printmaking studio. This in turn creates a safer system of practice and can heighten students' awareness of safety in the arts.

2.3.2 Earth System Science

The application of the General Systems Theory to macro systems like the earth system, created a framework for understanding the complex and interrelated parts of our earth system. The Earth System Science approach was developed based on observations of earth from outer space. This vantage point allowed the earth to be seen as a whole, and scientific instruments placed in this advantageous position allowed the different parts that make up this whole to be identified, studied and monitored in greater detail. Data collection from this vantage point has allowed different parts of the earth system, and the relations between these parts, to be studied continuously (Ruzek, 1997 p. 689).

In 1988 the Earth System Sciences Committee stated that "maturation of traditional disciplines, a global view of the Earth from space, and the recognition of the human role in global change have combined to stimulate a new approach to Earth studies - Earth System Science. In this approach, the Earth system is studied as a related set of interacting processes, rather than as a collection of individual components" (Lee, 2002 p.13). The four largest components in the earth system are the atmosphere, comprised of the gases in the outer layer of the earth system; the hydrosphere, comprised of the water on the surface of the earth system; the lithosphere, comprised of the land and upper crust covering the earth; and the biosphere, comprised of living organisms which inhabit the three spacial spheres. These four components interact with one another through dynamic, chemical, and physical processes driven by solar energy. Over the last century, the human component of the biosphere has

accelerated change in each of these four spheres through expanding socio-economic forces. The consequences of this rapid change include declining biodiversity, the depletion of the stratospheric ozone, and climate change (Malone, 1994 p.13).

In order to address the problems that are affecting the whole, we should improve the parts that are causing these problems by adopting practices that are sustainable, more efficient, and healthier. Creating an awareness of safety and risk within the global context of the 'Anthropocene epoch' requires a perceptual shift that reaches all aspects of the human consciousness. The term Anthropocene refers to the current geological era during which human activity impacts the environment in ways that rival or even exceed natural forces' influence on earth's systems (Steffen, 2011 p.3).

> *For hundreds of years, people worried about what nature could do to us – earthquakes, floods, plagues, bad harvests and so on. At a certain point, somewhere over the past fifty years or so, we stopped worrying so much about what nature could do to us, and we started worrying more about what we have done to nature.* - (Giddens, 1999 p. 3)

Humanity's relationship with the global environment poses an existential threat to many forms of life on earth. It is imperative that we re-evaluate the practices which we have relied on historically and make them safer and more efficient for the people working in these systems. Within the context of a printmaking studio, the use, storage, and disposal of hazardous chemical substances is an aspect of the studio system that can have negative impacts on the people in the system and the environments nearby. This can and should be evaluated and improved. "As artists, we can can help visually, and intellectually, to make people understand that, at some point, we have to accept that it is our collective impact that is putting the whole planet in jeopardy" ((Burtynsky and Ewing, 2016 p. 137).

2.3.3 The overview effect

Observations of the earth from space enabled humanity to comprehend the earth system as a whole. The experience that humans have when they view the earth from this position was first documented by Frank White in 1987. Through a series of interviews with 29 astronauts describing their experiences observing the earth, White identified the *overview effect.* "It might be tempting to attempt to explain the awe of the overview effect strictly as a response to perceptual vastness, and to equate the experience to that of viewing a natural feature on Earth. But where natural features on Earth suggest enormity, a distant view of Earth also

suggests totality" (Yaden et al., 2016 p. 4). Viewing the totality of the earth system from this position had a transformative effect on many of the astronauts.

> *The feeling of unity is not simply an observation. With it comes a strong sense of compassion and concern for the state of our planet and the effect humans are having on it. It isn't important in which sea or lake you observe a slick of pollution or in the forests of which country a fire breaks out, or on which continent a hurricane arises. You are standing guard over the whole of our Earth.* (Yuri Artyushkin in Yaden et al., 2016 p. 3)

The overview effect represents a change in perspective that is an important theme in the printed works produced through this research. Observing landmarks from the orbital perspective abstracts these spaces and creates a very different experience for the viewer. Satellite imagery available to the public through online databases was a key resource used in this study to examine the impact of human activity on the South African landscape. These photographs provided a landscape overview which I incorporated into the subject matter of my printed works. The use of overview imagery focused on spaces where the impact of human activities like mining, waste disposal, and farming had changed the appearance of the landscape so dramatically that the effects were visible from high altitudes. These sites are visual markers which illustrate the influence that human activity is having on the global system.

When the South African landscape is observed from an overview perspective through satellite imagery, clear examples of destructive human activities are visible. The most prominent of these is the vast number of large mines and mine dumps scattered across the country. These large geometric forms represent the history of resource extraction which has fundamentally shaped the country and its people. Gauteng in particular has a dense concentration of these mined landscapes.

> *Not only has gold mining in particular been responsible for the formation of Johannesburg and its greater conurbation, it has spawned a war, set in motion great social divides, engaged exploitative labour practices, impacted the Highveld's natural ecosystems and produced great wealth for mining companies, banks and private individuals alike. These mining legacies remain imprinted on the cities, towns and urban nodes…* (Bobbins & Trangoš, 2018 p. 6)

For me as a practicing printmaker, the medium of copper etching is directly connected to mining because it relies on the mining system to provide copper for etching plates. This

means that each print created using a copper plate has in it a message of extraction and exploitation of the environment. I am aware that there exists a system of extraction and exploitation of the environment and that I am complicit in that system as a printmaker. The processes of corrosion, through which the copper plates are etched, echoes the digging and destruction of mined spaces and creates permanent scars in the plate surface where material has been chemically etched away. This connection between the etching processes and mining activities makes copper etching an interesting medium to use in exploring the destructive effects of mining.

> *Mining waste is a particular challenge in light of so-called 'ownerless and derelict mines'. The Department of Mineral Resources has compiled a ranked database of ownerless and derelict mines which, abandoned by their previous owners, have become the responsibility of the state. The ranking is based on the degree of environmental risk that the mines pose to both the environment and nearby communities as a result of mine residue areas. A total of 6 152 ownerless and derelict mines have been identified in South Africa.* (Department of Mineral Resources, 2010)

The prevalence of these mining landscapes throughout South Africa and the environmental hazard that they represent to the communities situated in close proximity was an interesting and relevant theme to explore through my non-toxic printmaking practice. The mined landscapes and theme of human activity impacting the earth system have been explored by a number of artists whose work influenced my practice.

2.4 Review of relevant artists

Artists that have influenced this study and the printed works created through the research process include Edward Burtynsky, William Kentridge, Marnix Everaert, Susan Groce and Jake Brink. In the selected landscape works discussed below, these artists explore the relationship between human forces and natural forces. The works indicate a tension between these two parts of the earth system. Burtynsky and Brink photograph the scars that human activity leaves on landscapes through extractive mining processes; Kentridge's drawings include the theme of mining in our social history; while Everaert and Groce use non-toxic printmaking as a means of exploring their relationships to the landscape.

Edward Burtynsky is a Canadian photographer whose work is centred on capturing landscapes that have been shaped by human activity. Burtynsky's subjects include mining, agriculture, factories, dams, and waste storage sites. Burtynsky's photographs document

places where the natural ecosystems have been altered in ways that are visually striking. His photographs show the scale of human activities around the world and draw attention to the human interventions that have reshaped these sites. The resulting images are as beautiful as they are disturbing. Burtynsky's photographs are often taken from high altitude vantage points, which allow the images to communicate the scale of the landscapes depicted. Some of these images abstract the subjects and turn them into arrangements of colour, line, and texture. An example of such an image is the photograph in Figure 2.1 titled *Silver Lake Operations #16* (2007). This photo depicts a mining operation at Lake Lefroy in Western Australia. The landscape is crisscrossed with roads, littered with mine waste and marked by a deep scar in the surface where raw materials have been extracted. To Burtynsky, these voids left in the earth are a lasting testament to the desires and ambitions which drive humans to extract and consume the earths raw materials on such a large scale (www.edwardburtynsky.com).

Burtynsky's photographs played a pivotal role in drawing my interest toward the anthropogenic scarring of the earth's surface. The scale of the landscapes seen in his work, as well as the beauty of the colours, textures and composition, impacted my perspective on environmental degradation. This caused me to begin seeing the impacts of mines, factories and large human developments as both beautiful, in the colours, shapes and textures they create, and grotesque because of the way they impact their surroundings.

Figure 2.1 Edward Burtynsky, *Silver Lake Operations #16* (2007) Lake Lefroy, Western Australia, Photograph. © Edward Burtynsky (2018)

The subject of mined landscapes in South Africa has been a recurring theme in William Kentridge's work. In his series of drawings, *East Rand Proprietary Mines Cash Book* (2014), created between 2011 and 2014 (Figure 2.2), Kentridge depicts 54 landscapes observed in and around Johannesburg. Underneath the drawings are pages from mining cash books and ledgers which connect the works to the companies responsible for creating these mined landscapes. His depictions in pastel, charcoal and coloured pencil show a series of altered landscapes that have been scarred and changed through the mining process. Some of these changes occurred recently and are easily identifiable in the drawings while others are hard to spot among the sprawling vegetation that has grown over time to cover the altered land. The theme of censorship and forgetting is evoked in his use of red and black marks to block out parts of the landscape and details in the ledger pages underneath. Kentridge's depiction of a landscape in flux asks what has been hidden in these landscapes and whether the exploitation of the land and the labourers that shaped the land will be forgotten.

These images are an eye level depiction of the spaces as observed by the artist. The use of observation in Kentridge's drawings inspired me to visit the mined sites in Johannesburg to experience the spaces in person and to document visible indications of human mining activity. Kentridge's drawings depict the landscapes in a traditional visual plane that an observer can identify, unlike Burtysky's composition which appears abstracted and is not immediately identifiable as a landscape. This contrast of perspectives, one from the traditional plane of view and one that uses an elevated view, made me think of the two different perspectives through which I experience anthropogenic change. One being the immediate surrounding which I can observe as Kentridge does, and the other being the general systems view, which, like Burtynsky's photographs, requires a change of perspective that reveals the bigger picture.

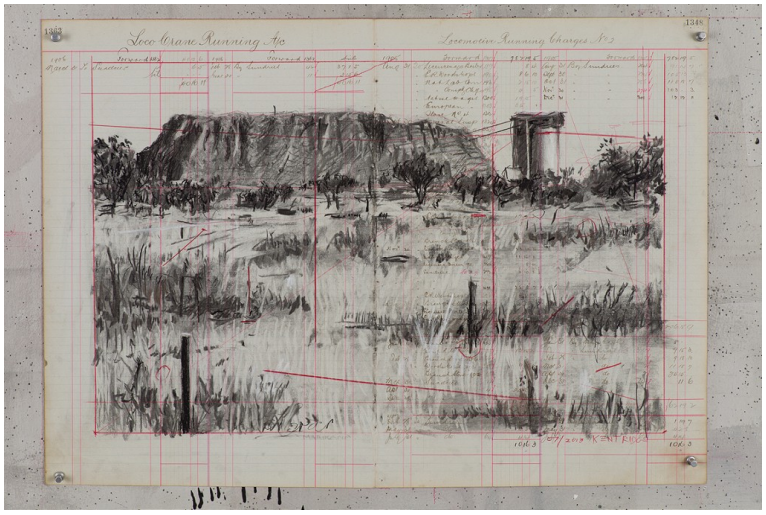

Figure 2.2 William Kentridge, *17 km from Rustenburg,* (2013) no. 51. Charcoal, pastel and coloured pencil on ledger book paper. Goodman Gallery (2014)

Marnix Everaert uses non-toxic methods in his printmaking practice to produce images that depict and explore imagined worlds. Everaert's works read like the notes of a 19th century explorer trying to record the defining characteristics of new landscapes and the plants, insects and micro-organisms that inhabit them. An example of this is seen in Figure 2.3 from his series of ten silkscreen prints, titled *Mystères de Nature* (2003). The series of prints compile a notebook with a cover page and index followed by eight prints composed of cluttered sketches describing complex systems of plants, landscapes, insects and chemical reactions. These strange subjects are seen from multiple angles, in cross section, with small labels and notes. These detailed records of imagined worlds act as a response to a complete exploration of the earth by humans. The images are a form of mourning of the state of natural habitats which are no longer untouched, as human activity has become one of the dominant forces in the earth system. Everaert elaborates on this theme in the interview in Chapter Four and more of his prints are reproduced there.

Figure 2.3 Marnix Everaert, *Mystères de Nature* (2003) no. 4. Screenprint, edition of 7. Marnix Everaert (2003)

Susan Groce's installation of intaglio prints, titled *Invasive Species* (2008), seen in Figure 2.4, used the photopolymer intaglio-type process to create a series of 216 printed images. These images juxtapose macroscopic views of hurricanes and military airfields from above with electron microscope photographs of seedpod plant structures. Groce uses non-toxic materials to create works that explore anthropogenic change in the earth system. The subjects in this installation create connections between the basis of life in the form of seed pods and the forces of nature such as wind, which carry these seeds. The human elements depicted by the military airfields allude to the impact of human activity on natural systems. In her statement on this work, Groce notes that the warming of the ocean currents as a result of human activity increases the frequency and volatility of hurricanes which can simultaneously bring destruction and carry new life (Groce, 2017 p. 25).

Groce's use of the photopolymer process to print photographic images motivated me to use this process. In Groce's series of prints the connections between microscopic and macroscopic structures made me think about the different ways in which the chemical residues of human activity influence the environment. The combination of these scales and perspectives is echoed in my use of photopolymer to create a series of colour prints depicting satellite views of South Africa and close-up photographs of acid mine drainage.

Figure 2.4 Susan Groce, *Invasive Species* (2008) Photopolymer intaglio-type (detail showing 16 of 216 segments). University of Maine (2017)

Jake Brink's photograph series, *Recycled Landscapes,* started in 2006 and documents views from the Brakpan tailings dam in Gauteng, South Africa (Figure 2.5). Brink's photos show barren landscapes devoid of any vegetation or signs of life. These lunar-esque landscapes illustrate the hostile nature of the mine waste sites. Brink's interest in the mined landscapes stems from their centrality in shaping his home city of Johannesburg. Brink's photos capture the inhospitable state of many of these sites, drawing attention to their continued impact on the communities located near them. These photographs illustrate the environmental problem discussed by Kerry Bobbins in *Acid Mine Drainage and its Governance* (2015) and by Bobbins and Trangoš in *Mining Landscapes of the Gauteng City-Region* (2018). These two papers detail the problem of acid mine drainage, the history of mining and its impacts on the Gauteng region respectively.

Acid mine drainage and the large sandy mine dumps depicted in Brink's photos were an important part of my practice. These toxic materials in the landscape were an interesting subject to be explored through non-toxic intaglio processes. This contrast of subject and medium provided an intersection of my personal participation in destructive human activities, and my hope that these activities can be reduced and improved to benefit both the participants and the environment.

Figure 2.5 Jake Brink, *Recycled Landscape (*2006) Photograph. FotoZA (2018)

2.5 Summary

The aesthetics associated with intaglio printmaking has evolved over a number of centuries and is seen in the printed works of old masters like Rembrandt and Goya. This traditional aesthetic was guided by the characteristics of the materials used in traditional etching methods and the fine draughtsmanship of the artist working in this medium. Over the last three decades a number of printmakers and researchers have begun a process of developing new etching methods which achieve the same aesthetic characteristics as traditional methods using safer materials. While the literature provides thorough instructions and tutorials for printmakers interested in learning non-toxic processes, practical experience is an essential method of data collection for developing a non-toxic printmaking practice. Many of the materials and commercial products used in the literature on non-toxic printmaking are context-specific to Europe and North America. This leaves a gap in knowledge and is a research opportunity for intaglio printmakers working in South Africa.

The process of developing a non-toxic intaglio method requires a systematic evaluation of the various parts of the etching and printing processes. By evaluating each individual part of the etching process, alternative materials can be identified and tested to establish a new working method centred on minimising hazards in the studio. The systems framework facilitates this procedural approach to research. Systems theory is carried over into the thematic concern of the research, which explores the visual state of the earth system using overview perspective. The visual indicators of human activity found scattered across the surface of the earth allude to the force of human activity and its impact on the delicately-

balanced earth system. This topic has been explored by artists working in a variety of mediums, including non-toxic intaglio printmaking.

CHAPTER 3: METHODOLOGY

3. Introduction

This chapter details the research paradigm, methods of data collection, participants, ethical considerations, and limitations of this research. Using an ethnographic approach to case study, I conducted an interview, observations, and artistic practice to generate a 'thick' (Yin, 1992) description of the non-toxic intaglio printmaking system developed at the Academy for Visual Arts in Ghent. This data was then analysed and tested at the Centre for Visual Arts at UKZN and produced both theoretical data and printed artworks.

3.1 Practice-based research paradigm

According to Linda Candy, "Practice-based Research is an original investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice" (Candy, 2006 p. 3). The research culminated in a body of work created using non-toxic printmaking materials and processes. The research processes systematically tested various materials to produce visual artefacts in the form of printed images. The printed image was the indicator that revealed the success of each process and material to produce replicable aesthetic results that were comparable to the established traditional printmaking aesthetic. The practical research allowed me to expand my printmaking method by incorporating new aesthetics developed with non-toxic materials.

The research questions were explored through the creation of the printed images (Marshall, 2017 p. 24). Images were printed at intervals during the etching processes, in a process that was both iterative and progressive to produce prints that functioned as indicators of the state of the plate. This interactive process continued until I was satisfied with the printed image, at which point the full edition was printed. The printed images also influenced one another, shaping the subject matter of the images and the application of the techniques to create the next image. Practice-based research has been defined as constructivist because of the progressive production of images through research, which influences the content and means of production of more images (Marshall, 2017 p. 24).

According to Sullivan (2005), practice-based research in art is not only about creating new knowledge, as is traditional in research, but also about re-arranging existing knowledge through visual practice which changes the viewer's perception of the knowledge presented. The representation of this knowledge allows the artist and the viewer to create meaning through their interactions with the visual. Marshall comments that the goal of practice-based

research "is to transform perception: to change the way we see or interpret things" (Marshall, 2017 p. 25). The method of this research, within the practice-based research paradigm, finds new information in the form of non-toxic printmaking materials and uses it to produce familiar aesthetic effects. One of the goals of this research was to create new printed images with characteristics that are indistinguishable from images produced with traditional materials. The success of these new materials allows printmakers to change their perspective on the relationship between traditional materials and methods and traditional aesthetics.

3.2 Case study

The chosen methodological framework for this research was a case study. The case study was centred on the non-toxic printmaking studio at The Academy for Visual Art run by Professor Marnix Everaert. A case study is an empirical inquiry into a contemporary phenomenon that gathers information from multiple sources within its real-life context (Nieuwenhuis in Maree, 2007). A case study should provide a holistic understanding of the system being examined. A case study centres around a unit of analysis (Maree, 2007), which in this research, focused on safe printmaking practice to reduce personal risk. In order to understand the phenomenon holistically, an ethnographic element was incorporated into the case study. While ethnography and case study are not the same method, they are more similar than dissimilar (Willis, 2007). The primary difference between ethnography and case study is that ethnographers "always include in their focus the culture of the group or entity under study" (LeCompte and Schensul, 1999). I was able to analyse my time in Belgium as an immersive experience and gained better understanding of the beliefs and behaviours that shape the printmaking practices at the Academy. The use of an ethnographic approach assisted in guiding data collection for this case study.

The case study framework allowed me to gather rich, detailed data in an authentic setting, gaining understanding of the lived experience within its social context (Willis, 2007). I was able to observe and participate in non-toxic printmaking at the Academy. This non-toxic studio demonstrated safe printmaking practice and allowed me to gather information with which to build a model for improving the safety of practice at the Centre for Visual Arts (CVA). Through my printmaking practice I gathered data about the materials and processes used.

3.3 Ethnographic research style

In an ethnography, the field under study can not be controlled as it would be in a scientific study. The researcher must enter into the field as an invited guest and make observations from within the context without controlling or altering the context to suit the study. The circumstances of the study may vary, and studies may not always reveal the same results, because the goal of an ethnographic study is not to create a replicable set of results but rather to create an accurate picture of a people group's beliefs, behaviours and practices. Willis (2007) describes ethnography as "an umbrella term for field work, interviewing, and other means of gathering data in authentic environments… [that] puts the researcher in the setting that he or she wants to study." The research setting being studied is subject to many external and uncontrolled factors. The ethnographic setting is an open system (Bertalanfy, 1978), which the researcher enters into in order to make observations about its internal elements and their interactions with one another.

LeCompte and Schensul (1999) describe seven characteristics that comprise an ethnographic study, which provide helpful guidelines for characterising my study, although not all of these were explored:

(1) The natural setting of the study.
(2) The intimate interactions with the participants.
(3) Accurate reflections of the participants' perspectives and behaviours.
(4) It builds cultural theories using inductive, interactive, and recursive data collection.
(5) It uses qualitative and quantitative data sources.
(6) It contextualises the behaviours and beliefs under study.
(7) It interprets results through the lens of culture.

"The first defining characteristic of ethnography as scientific inquiry is its commitment to producing a story about events as they occur in their natural settings" (LeCompte and Schensul, 1999 p. 9). My observations were focussed on the technical aspect of studio practice rather than on the cultural aspects of printmakers working in the studio. The natural setting of this study was the printmaking studio at the Academy for Visual Arts in the city of Ghent. My immersion in Ghent culture helped me to understand some of the factors that influenced the people and the studio under study. My presence in the printmaking studio and the familiarity that I was able to build up with the studio and fellow students allowed me to observe their behaviour and practice as it occurred naturally. I spent between 36 and 40 hours per week in the printmaking studio, while the local students were allowed a maximum of 21 hours of studio time per week. The additional time in the studio allowed me to make observations with and without students present.

“Ethnographers must become intimately involved with members of the community or participants in the natural setting…” according to LeCompte and Schensul, (1999 p. 10). During the three-month immersion in Ghent, I developed a close friendship with Professor Everaert, who gave generously of his time by establishing regular meetings outside of the studio practice hours. These included weekly dinners with Everaert’s family and morning coffee at a local coffee shop on Tuesdays. These meetings facilitated intimate interactions and built rapport outside of the research and printmaking context. The formal interview with Everaert, which was conducted towards the end of the immersion period, benefitted greatly from these regular interactions. The interview covered a range of topics and provided insight into Everaert’s past and the factors that guided his decision making when he started working with non-toxic materials.

To accurately reflect the views and perspectives of individuals participating in this study I had to overcome several cultural and linguistic barriers (LeCompte and Schensul, 1999 p. 21). One of the biggest challenges encountered in Ghent was the linguistic barrier between myself and the Flemish-speaking local population. The majority of people that I interacted with spoke Flemish as their first language and English or French as their second language. Flemish is similar to Dutch and thus also Afrikaans, which gave me a slight advantage as an Afrikaans-speaking researcher. However, conversations with many of the students were often strained or unclear. I had to rely on visual observations of the students’ behaviour and printmaking practices to understand some aspects of their practice. To avoid drawing incorrect conclusions, observations were often brought to Professor Everaert and discussed to verify their accuracy. Everaert is proficient in English, and interactions were generally unaffected by linguistic challenges.

Lessons at the Academy were held in the evenings from seven o’clock to nine o’clock in the evening and I attended several of these. During these two-hour sessions, a lecturer would introduce and demonstrate a technique to the students. These lectures were predominantly in Flemish and could only be recorded through visual observations. The demonstrations where still valuable and often prompted new areas of interests which I had not previously anticipated. Everaert made a point of covering any topics that I requested in the mornings before other students arrived. This allowed me to ensure that my observations where accurate and that I had a thorough understanding of the materials and techniques demonstrated in the lectures.

The research question as to whether or not traditional etching aesthetics can be replicated through non-toxic practice was explored through printmaking practice at the Academy and fulfilled another characteristic of an ethnography that “ethnographic research… uses

inductive, interactive, and recursive processes to… explain the beliefs under study" (LeCompte and Schensul, 1999). After observing the processes and taking notes, I created prints using the non-toxic processes and examined the resulting printed images. Inductive analysis of the success of non-toxic materials in the Belgian studio context led me to believe that these methods can be transferred to the CVA. The successful prints were specific data points which led me to the general conclusion about non-toxic printmaking.

My processes were recursive as I tested each printmaking technique multiple times to ensure that the results were consistent and predictable. When the results were not satisfactory, or if the process had failed (as it did in some cases due to mistakes on my part), I was able to consult with Everaert and make repeated attempts until I had a thorough experiential understanding of the technique. In this way I could go back and forth, comparing the non-toxic prints to my understanding of the traditional visual characteristics of etching that I sought, which allowed me to judge whether the non-toxic processes delivered suitable results. Each of the processes was tested multiple times, creating a body of prints that illustrate the visual characteristics and consistency of the non-toxic processes.

Another important aspect of ethnographic study "is that its interpretation of what people say, do and believe is guided by the concept of culture… Culture consists of the beliefs, behaviours, norms, attitudes, social arrangements, and forms of expression that form a describable pattern in the lives of members of a community or institution" (Shensul, 1999). This study looked at the beliefs, behaviours and norms at the Academy to better understand the practices and materials used. Non-toxic printmaking exists within a specific cultural context, and the transition away from traditional materials allowed a unique culture to form at the Academy. This culture was shaped by Everaert's research style: a trial-and-error approach to printmaking processes that encourages experimentation with new materials and processes. Understanding some of the factors that helped shape this safe and creative culture helped me improve the safety of my own practice so that it is not impeded by unnecessary hazards.

3.4 Participants

Marnix Everaert was the primary participant of this study. After our meeting at the Caversham Press in 2016 I decided to make non-toxic intaglio the subject of my master's research and, with the assistance of my supervisor, asked Everaert whether he would agree to participate in my research. Everaert invited me to spend three months in Ghent as a guest student. The case study was centred on Everaert's printmaking practice, the school where he taught this practice, and his interview with me, where we discussed these and other topics.

The relationship established between Everaert, the CVA, the Caversham Press, and myself, helped establish rapport between myself and Everaert and made this research opportunity viable. As is discussed above, rapport is an important aspect of ethnographic case study research.

3.5 Ethical considerations

All research studies are required by the university to gain ethical clearance. The main principles governing research ethics include confidentiality, informed consent and nonmalefice.

1. Confidentiality

Everaert's willingness to participate in this research, including his willingness to be interviewed and to be named in the dissertation, was established through email correspondence before the immersive component of the case study took place. No other printmakers other than myself and Everaert whom I interacted with with during this research were interviewed or named.

2. Informed consent

The interview questions were evaluated prior to the approval of the proposal for this research and ethical clearance was acquired from the University. Everaert was informed of the interview and was given the interview questions prior to the interview taking place. The interview was conducted at Everaert's house and consent was given for me to record the interview.

3. Non-maleficence

This case study did no harm to the participants. The data gathered through interview and observation of Everaert focussed on the nature of non-toxic printmaking practices developed by Everaert, the factors that influenced his decision to research these methods, the studio where he teaches these methods, and the themes explored in his artworks created using these methods.

Some ethnographic researchers like Murphy and Dingwall (2007) argue against the requirements that ethnographic research obtain prior informed consent, as this contact with the research participants may alter the natural setting and behaviour under study. This is not to say that ethnographic studies are free from ethical considerations, but rather that the standard ethical regulations used in many research institutions were developed for discrete, episodic interventions typical of clinical, biomedical, and survey research styles (Murphy

and Dingwall, 2007 p. 2225). In these instances the design of the research can be finalised before the research begins and is carried out in a controlled setting. By contrast, ethnographic study avoids influencing the environment under study and cannot always predict exactly what the study will involve. In ethnographic research, consent is negotiated over time as the researcher and participant build a relationship (Murphy and Dingwall, 2007 p. 2224). It is possible that interactions with Everaert were influenced by the formality of this study, the institutional requirement for informed consent, and the agreement that Everaert would be named in the dissertation. I am confident that these possible challenges were overcome as I was able to build rapport with Everaert.

3.6 Methods of data collection

According to LeCompte and Schensul, the researcher in an ethnographic study functions as the data collection tool by relying on his or her ability to systematically observe the field under study. The eyes and ears of the researcher are essential tools through which the researcher records these observations (LeCompte and Schensul,1999 p. 2). Some ethnographers collect both qualitative and quantitative data. Generally an ethnographer will begin by collecting quantitative data until they have developed an understanding of the phenomenon under study. The researcher is then able to develop context-specific qualitative tools which will suit the context of the culture that is being studied (LeCompte and Schensul, 1999). However, this mixed methods approach did not apply to my research in which only qualitative data was collected.

The data collected in this study came from observations in the printmaking studio, photographs, one interview, my printmaking practice, document review of recipes, material safety data sheets (MSDS), and collected artefacts in the form of prints and etching plates produced through non-toxic practice and materials acquired in Ghent. Each of these provided different insights into the nature of non-toxic printmaking practice at the Academy for Visual Arts in Ghent, and together they allowed me to study the benefits of non-toxic printmaking practice.

The recipes for non-toxic materials and the ingredients' MSDS files provided data through which an understanding of their hazards and a comparative analysis was compiled. This data established a heightened awareness of important studio practices, such as storage and disposal of hazardous chemicals and chemical waste, and set important guidelines in place for designing a studio system that is safer.

The interview and observations produced qualitative data describing the beliefs, motivations, and values which guided the development of non-toxic printmaking practice at the Academy. The interview was conducted at Everaert's house towards the end of my stay in Belgium. I asked him the ten questions formulated in my proposal which he answered over a period of 70 minutes. After recording the interview, I transcribed the information and sent it to Everaert to proof read. He submitted some adjustments where small details like names of artists had been transcribed incorrectly. I then analysed the content of the interview and my findings are discussed in a later chapter.

The artefacts collected, including prints produced with non-toxic processes and materials, provided qualitative data about the success of these processes in replicating and expanding on traditional etching aesthetics. The resulting printed images were then analysed and compared to examples of traditional printmaking materials to assess the success of these new materials. This comparative process was subjective and relied on my knowledge and experience as a printmaking student. The basis for this knowledge of these aesthetics comes from my education in printmaking at the University of KwaZulu-Natal.

Practice-based research was one of the primary tools for data collection. Practice produces two forms of data: an experiential knowledge and the resulting artefact. Experiential knowledge is gained by the practitioner as they engage the systems of printmaking techniques to produce a printed image. The printed image is the second form of data. It is a result of the artist's actions as well as an indicator of the processes that the artist used. The knowledge gained through my practice is detailed in the case study section of this dissertation. This section details the non-toxic materials and processes used, recording most of the knowledge gained through my practice. The printed works reveal the results of this practice, and they are an equal part of this research. They are the proof, the answers to the research questions. They allow other individuals to judge the success of the research in testing the aesthetics of non-toxic materials, and as this research exists as qualitative data, it is essential that both the printed works and the dissertation are assessed.

Furthermore, the printed works connect my concerns about the safety of the printmaking studio to my concerns about the state of the South African landscape. The importance of changing our perspectives to favour safer practices is applicable both to the creation of these printed works through non-toxic materials and to the subject matter which explores environmental degradation around mines and mined areas in the landscape. The subject matter layers multiple perspectives and creates juxtapositions of these perspectives, rearranging them to create interruptions in the landscapes. Changing perspective is a theme in my printmaking practice, printed works, and research paradigm.

> *Studio-based research is not concerned with generating new information (as conventional research generally is) but with re-construing existing information. Its goal is to transform perception: to change the way we see or interpret things. Transforming perceptions generates insight, new understandings and new perspectives that make sense of perceptions and experience in new ways. New insights represent new knowledge and they create new knowledge. Studio-based research is well suited for this transformative role precisely because visual images are its primary medium.* - (Marshall, 2017 p. 25)

3.7 Limitations of the research

The findings of this research are limited to the context of the printmaking studio that were observed in this study. The recommendations for improving safety in printmaking may not apply generally to any context as they have been designed specifically for the CVA, however, printmakers working in Belgium and in south Africa may find these recommendations useful and applicable if they have access to the necessary materials and infrastructure.

This research was influenced by several limiting factors. The first factor was the availability of printmaking materials. As many of the developments in non-toxic printmaking have taken place in American and European printmaking studios, the materials used in the development of these new processes were not easily accessible. Many of the materials referred to in the literature were not accessed or tested in this research.

It is also possible that there are better alternatives available in South Africa, but with the time constraints on this research, I was not able to find or test these materials. While my research does not compare the results of many different non-toxic materials, it does show what can be achieved with this specific combination of materials. There may be better solutions available.

The three-month trip to Belgium was also a limitation, as more time would have allowed for more tests to be conducted and more printed works to be produced with different non-toxic materials. With the time constraint, it was not possible to try some of the processes found in the literature despite the materials being available. However, the tests conducted did cover the essential techniques used most often in intaglio printmaking practices at the Centre for Visual Arts.

The language barrier in Belgium restricted my interactions with the staff and students at the Academy. I made an effort to ensure that I understood the processes and materials under study but was not always able to communicate effectively with the Belgian printmakers. In my interactions with Marnix Everaert this limitation was less impactful on our ability to communicate. However, it is likely that there were some instances where we did not fully understand one another. If these misunderstandings were related to practical details about printmaking processes, they often resulted in flaws in the processes, which I could show Everaert in order to clarify the misunderstanding. To minimise these instances in the interview with Everaert, he reviewed my transcript of the recording and made corrections where I had misheard or misunderstood in the transcription processes.

Potential bias in this research could be seen in my interest to study safer printmaking to improve safety at the CVA. The printmaking classes at the CVA are small and infrequent and there have been no major accidents or hazardous events related to intaglio printmaking materials or processes since my enrolment in 2012. There may be little interest from future printmakers at the university to implement the non-toxic processes when traditional processes may be more convenient. My investment in learning these processes may have caused me to value non-toxic practice more than other printmakers who are not aware of chemical hazards or as concerned with safe practice and the environmental impacts of safe practice.

3.8 Conclusion

This research was conducted through artistic practice informed by observations, interview, artefacts, and document review, to produce qualitative data. Inductive analysis of the data gathered in the case study of the Academy for Visual Arts in Ghent was used to create a theory of safe practice that could be transferred to other studio contexts like the Centre for Visual Arts.

CHAPTER 4: CASE STUDY

4.1 The Academy for Visual Arts in Ghent

4.1.1 Introduction

This chapter examines the data collected during my time at the Academy for Visual Arts in Ghent. The data was collected by interview, observation, printmaking practice, and document review. This chapter includes photographs which show the materials and studio systems described as well as material recipes and detailed descriptions of working processes. The first section in this chapter is a discussion of my interview with Everaert, which unpacks his motivations for working with non-toxic materials, his interest in creating safer working environments and reducing waste output, his role at the Academy, and his personal practice as a printmaker. The second section is a detailed technical record of all the printmaking techniques I learnt at the Academy. The descriptions is this section will enable a printmaker with access to the materials listed to work with non-toxic printmaking techniques.

The Academy for Visual Arts Ghent is an art school that offers part time evening classes to adults. The school has several departments offering courses in different mediums ranging from photography and animation to painting, drawing and printmaking. My case study focuses exclusively on the printmaking department. Marnix Everaert is the senior lecturer in the printmaking department. Everaert has worked exclusively with non-toxic materials since 2000 and has played a leading role in developing non-toxic intaglio processes in Belgium. Everaert has led workshops on safe printmaking at universities, schools and studios in Belgium, Spain, Holland, the USA, Japan and South Africa. He teaches intaglio alongside two colleagues. One specialises in relief printing methods and the other in silkscreen printing. The department currently has around one hundred students enrolled in various stages of the program. Enrolment in the class grants students access to the studio space from 2pm to 9pm on Tuesdays, Wednesdays, and Thursdays. During my three months at the Academy for Visual Arts Ghent, I had access to the studio from 9am to 9pm on Tuesdays, Wednesdays and Thursdays while Everaert and a visiting professor from Japan where working there. This extended access allowed me to work in the studio alone in the mornings and with the other students in the evenings. It also allowed Everaert to bring me up to speed on studio practice and cover some topics in more detail, without distracting from his standard teaching in the evenings.

I found that the studio was very safe. During the period of the study there were no spills, accidents or emergencies. Students printing in the studio were very methodical in their use of

the dangerous materials, always using the appropriate safety equipment. At the end of each day, the working surfaces where wiped down with the appropriate cleaning materials and all the materials and tools that had been used were stored away. Students consistently cleaned their own areas and left the work spaces ready for the next printmaker to start working. One factor that may have contributed to the cleanliness of the studio was the high number of students working on different projects in the shared space. The expectation had been established that each surface would be cleaned after use and that every student could expect to find a clean space when they started working. The working culture, modelled by the staff, prioritised safety and cleanliness and educated each student to work carefully and clean correctly. Any incorrect practice would stand out and be noticed quickly. I felt the pressure to work in a mindful and safe manner that would avoid negative impacts on the other students and staff in the studio. Through the following interview, I gained some understanding of the processes through which Marnix Everaert established this safe and mindful printmaking culture.

4.1.2 Interview with Marnix Everaert

My time living in Belgium and working in the studio with Everaert and his students allowed me to immerse myself in their printmaking practices. This period of immersion allowed me to study the culture in its naturalistic setting through participant observation (Maree, 2007). The ethnographic component of this study was essential to understanding the success of a non-toxic printmaking studio within its cultural, economic and social context. I was able to build rapport with Everaert and several students, observe their behaviour and learn about their world view and how that has contributed to the success of the studio. World view was a very important factor in Everaert's transition to non-toxic practice. In my research interview with him, I learnt about his early years and how he developed an interest in living an environmentally sensitive lifestyle that minimised his participation in wasteful practices.

4.1.3 Interview questions

The ten questions discussed during the interview were:

1. What was your motivation for working with non-toxic materials?
2. Were you a student or a working artist when you made the transition?
3. What role did personal risk perception play in your decision making?
4. How did this transition impact your work both aesthetically and conceptually?
5. According to Michael McCann, "Art teachers are responsible not only for their own health, but also for safeguarding the health of their students" (McCann 2001). What are your thoughts on this statement?

6. John Pengelly states that “individual artists are willing to accept surprisingly high levels of risk… provided that the risks are self imposed and that the consequences lie many years ahead" (Pengelly 1997). Many of the harmful chemicals used in traditional printmaking take a long time to affect the artist’s health. How would you teach younger students to be mindful of these effects?
7. What role do you think artists can play in improving risk awareness in society?
8. How does the global narrative of environmental degradation and risk impact your work as an artist?
9. How do you minimise waste production in your studio?
10. It seems that non-toxic printmaking is not simply about using alternative materials, but also about understanding our relationship with our global environment. What kind of conceptual shift, if any, do you think is necessary to encourage artists to create safer working spaces with minimal environmental impact?

Four themes arose in my interview with Everaert. The first theme was Everaert’s introduction to non-toxic printmaking. This includes the factors that lead him to be interested in non-toxic practice and the challenges he faced when he first started experimenting with alternative materials. The second theme was non-toxic practice at the Academy for Visual Arts Ghent and his approach to managing students to create a safe and free creative environment. The third theme was the environmental impact of studio practice and how to minimise waste without preventing students from experimenting freely. The fourth theme of the interview was Everaert’s artistic practice and the concepts and subject matter that inspire his work.

4.1.4 Everaert’s introduction to non-toxic printmaking

In the early 1990s, Marnix Everaert was working at a small art school in Zotterham. Before he was introduced to non-toxic methods, they used many solvent-based processes and materials. Everaert recalls long days working with solvent based silkscreening and their nickname for the processes,

> Gliding in Flemish is zweefen, you can also use it for someone who is ‘not there anymore’ he is ‘zweefing’. Instead of zeefdruk (screenprinting) we used to call it zweefdruk! You were standing there and you got all these solvents and actually it would make your brain react differently. I had to print a lot for that school. I was there in the morning ’til eight in the afternoon and then I have to teach in the evening… I felt completely dry inside and my head was not working. So I really wanted to find something else.

Everaert was first introduced to non-toxic printmaking through a workshop at the Frans Masreal Centre in the late 1990s. The workshop, lead by Jeffrey Sippel from the Tamarind Institute, introduced simple alternatives, like cleaning with vegetable oil. “This was jaw dropping,” says Everaert, and from there he began looking into residencies recommended by Sippel and purchased Keith Howard’s book on non-toxic printmaking. Unfortunately, he found that the book was specific to American printmakers and that most of the materials were not readily available in Europe. Eventually, he traveled to the USA to meet Keith Howard and developed a good friendship with him. This prompted Everaert to take a more experimental approach to his own practice and find locally-sourced materials that would work in the European context. The approach Everaert took is very similar to my own approach to finding non-toxic etching methods in this research. There are many parallels, including his international travels to work with non-toxic printmaking researchers, his use of Keith Howard’s literature, and the challenge of finding local substitutes for materials from foreign countries.

4.1.5 Non-toxic practice at the Academy in Ghent

Everaert’s position as an art teacher was key to this progression and his research into non-toxic approaches. Question five of the interview states: “Art teachers are responsible not only for their own health, but also for safeguarding the health of their students” (McCann 2001). After hearing this quote, Everaert responded simply: “He is right of course,” elaborating that your interest as an artist will always affect your collaborators and students (if you teach). By making the studio safer, you are not only looking after yourself, but you are also improving the experience of other people who are sharing the working space, which makes the art form more appealing. Conversely, if you do not take responsibility for creating a safe printmaking environment, you are “digging your own grave, or you’re digging the grave of printmaking." As a student, “you just want to learn and follow what other people say,” and so the responsibility to challenge unhealthy traditions lies with the teacher.

“I’m a big defender of non-toxic, but I’m still asking questions. You must be skeptical; you must always think, ‘is this actually better than the other thing?’” This mindset has ensured that Everaert’s students have freedom to work with the new non-toxic materials in flexible ways. Everaert likes to think of his studio as a big laboratory where he and students work together to test new ideas and techniques in the hope of expanding the versatility of printmaking and not becoming dogmatic in their practice. “If you have a lot of people doing this for you, it’s a very nice way of researching. It’s a playful way also. It’s trial and error.” Everaert feels strongly that the aesthetic characteristics of etching and silkscreen printmaking have not been altered in a negative way. “The thing is, etching is still etching,

you know, silkscreen is still silkscreen. With intaglio, it gave me more freedom, certainly with aquatint. You can draw with the spray gun, you can mask out areas. You don't have that with rosin. Rosin is just airborne and sinking onto your plate." Everaert takes an action research approach to studio practice, allowing students and staff to generate research as they experiment with processes to achieve their aesthetic or creative goals.

Everaert's influence at the Academy for Visual Arts Ghent demonstrates a healthy conceptual shift that improves the accessibility to and aesthetic applications of printmaking. "Well, I think you already noticed in our studio, my students can do whatever they want. I learn from them also. I just say try it, we'll see what's going to happen. It if doesn't work, I will help you; if it works, you found something very interesting. You have to be open-minded." The atmosphere at the Academy for Visual Arts Ghent is one of freedom and experimentation. This mindset has been formed by Everaert's own journey into non-toxic printmaking and the uncertainty of many of his experiments. Rather than the rigidity of traditional aesthetics achieved through traditional materials, the aesthetics are referenced and understood as a step in the changing possibilities and applications of printmaking. The increased safety of the studio and materials makes it possible for the studio to function in this way. The safer the materials, the more freely artists can experiment in a communal learning environment, which Everaert eloquently explains:

> A lot of universities teach their students how to become a printmaker with, and I don't have anything against traditional techniques, don't misunderstand me, but with materials that can be very harmful if they are not used well and of course they teach you how to avoid this with very expensive extraction systems for the fumes. You know this is costing so much money. A lot of professors don't want to change because it is costing them time, while I think, man, you're paid to do research in one or other way you know. It's research in thinking and researching in doing. Then you get students that come out of the university and they go on with what they have learned, creating an endless cycle. You really need somebody in there who's breaking the rules in one or other way. A conceptual shift is like I said, it's an open mind.

4.1.6 Environmental concerns of studio practice

In addition to the conceptual shift around practice, the studio is centred on reusability and waste reduction. The students are encouraged to use recycled newspapers for wiping their plates and drying plates and paper. They are taught to wrap excess ink in plastic and store it for later use. "I think unfortunately in art there is a lot of waste most of the times. At an

academic studio we always have waste production because it is part of learning. Even for artists it it still a learning process." Within the creative context, waste will be a by-product of practice as ideas are tested and new process are learnt. "It's about thinking as much as possible about what you can reuse or avoid using."

One way of improving the waste management is by sorting it. The studio has a series of bins allocated for different materials, including paper waste, food waste and other recyclable materials. Sieves are used in basins to stop acrylic particles from entering the wastewater system. The mindset of waste separation and recycling seemed to me to be a part of Belgian culture. Most households sort their waste, and there is an effective system for recycling materials. "In Belgium the waste handling is very good… every month you put your glass outside, you put your paper outside, everything in different containers and they come and fetch it." The municipal infrastructure makes it easier for everyone to participate in this culture of recycling. Similarly, the Academy for Visual Arts Ghent has a chemical waste storage facility that is cleared out annually. All of the hazardous waste is bottled, labelled, and stored in a small building and collected by a hazardous waste disposal company. Everaert also stores used cleaning agents like the Chrisal Economic product, which is used to strip acrylics and grounds off of the plates. The dissolved acrylics settle on the bottom after some months, allowing them to strain the product and use it again for cleaning plates. These kinds of practices are not only helpful for reducing the waste that the studio generates, but also economical as they reduce the cost of consumables for the studio.

Everaert's interest in non-toxic printmaking is not only motivated by the avoidance of personal health risks but also by an interest in sustainability and the role that human activity is having on the environment. "Personal risk is not only about 'is it going to affect me?' It is also 'is it affecting the environment?'" He discussed that his interest in sustainability can be traced back to his childhood and early adult years: "When I was a kid, we still had those garbage cans where you had glass together with food, together with metals… I already started thinking about the fact that I didn't understand why they were not separated out." When he turned eighteen and was eligible to take his driver's exam, he decided not to because "[he] had that feeling like there were too many cars in this world, so [he] never learned it." Living in a developed country with a good railway system and where cycling is a safe and common form of personal transport made this a viable lifestyle decision.

When asked what role he feels artists can play in changing the social awareness around environmental degradation, Everaert pointed out that throughout art history, art has been able to capture and communicate the feelings of artists. "I think artists have always been avant-guard in one or other way. They ask questions, and society starts thinking about it." Artworks

often capture the human experience in a historical moment, allowing the audience to look back and catch a glimpse of that experience. Everaert points to the work of DADA and German Expressionist artists who captured the horrifying nature of their lived experience in Europe between 1910 and 1930.

Artists in the anthropocene can record the impact that human activity is having on the environment as well as the feelings that people have towards this critical moment in history. The problem, Everaert points out, is that art can be inaccessible to the general public. “When you go to a museum or an art gallery and you compare that with going to a football game… more people see what is happening at a football game than will ever see what is happening in a museum.” Yet, artists do have the platform for asking critical questions and may be able to create a record of our time that will allow future generations to glimpse this period.

4.1.7 Everaert’s artistic practice

Through his own artistic practice, Everaert explores a world of his own making, a ‘dream world’. His works imitate the format of nineteenth-century drawings by explorers like Alexander Von Humboldt.

> I was really interested in how people looked upon the world in the nineteenth century and earlier. I really like those old *gravures* (draughtsmen). They had specific colours. They were about archiving, selecting and showing. On one page there would be a complete world. This really grasped me.

His subject matter depicts worlds uninhabited by humans, celebrating the imaginary flora and fauna and in so doing, mourning the reality that our surroundings have been so thoroughly explored, recorded and, in many cases, destroyed or tainted by human presence. His works depict “a kind of ideal world, a world where there are no humans. Sometimes I feel like we are a plague on this planet.” These dream worlds are an opportunity to escape, and Everaert likens his creative process to “stepping in fresh snow. When it has snowed, everything is silent. It’s like you’re the first one to walk there…”

His work also responds to the prevalence of the human figure in contemporary art by removing the human form completely and replacing it with an unseen character: the explorer, the draughtsman he cannot be, the observer who does not interfere, the observer that humanity can no longer be. “You feel that it is made by a human being because you feel that it is about archiving.” Everaert often includes small details that allude to the presence of the observer. Sometimes the recorded objects are arranged on a table; sometimes the prints’

delicate tones and lines recreate the look of a notebook or journal; and sometimes he includes small labels and notes.

When asked how non-toxic printmaking influenced his work, Everaert responded that the subject matter hadn't been determined by his medium or his interest in non-toxic materials. He clarified that, "If I hadn't been a printmaker, I would have been a painter probably, Maybe I would do the same stuff. It is about what you're interested in, and I am interested in a kind of popular science." Everaert's work catalogues landscapes, plants and cosmic events, drawing on science and scientific observation as an aesthetic tool. Everaert's aesthetic choice creates a meaningful contrast by imitating scientific language to depict worlds yet untouched by scientific discovery, pointing toward the negative impact that our excessive use of technology, and the sciences that drive these technologies, often has on the environment. Figures 4.1 and 4.2 are examples of Everaert's exploration of dream worlds through non-toxic printmaking.

Figure 4.1 Marnix Everaert, *Tranchomedusa* (2004)
Screenprint, (Everaert, 2018)

Figure 4.2 Marnix Everaert, *Sensu Allegorico* (2002)
Screenprint, (Everaert, 2018)

4.1.8 Conclusion

Everaert's account provided valuable insights into the process through which he developed his non-toxic printmaking practice. His journey had many parallels to the process that I am currently engaged in through this research. His story contextualises how printmaking practice at the Academy in Ghent encourages experimentation with alternative materials rather than teaching a dogmatic approach to printmaking. This has created a culture of experimentation where students are encouraged to try new methods and materials so that the medium is constantly improving and evolving. Everaert's story is important for contextualising the non-toxic printmaking practices observed and tested at the Academy in Ghent. These practices are described in Section 4.2 of this chapter.

Figure 4.3 Etching presses at the Academy for Visual Arts in Ghent, photographed by Eloff Pretorius (2018)

4.2 Technical observations

Evaraert's journey in printmaking is etched into the Academy in Ghent. Printmaking at the Academy is a system made up of people, teaching philosophies, and non-toxic techniques, which together create an environment of collaboration and experimentation. This was my own personal experience as a printmaker at the Academy in Ghent. Everaert often had a group of students following him as he tried to solve the various problems that printmakers might encounter on a given day.

The studio space is much larger than the CVA printmaking studio and accommodates a larger number of printmaking students. The busyness of this environment was dissimilar to the CVA, where I was often the only printmaker using the studio space. Being surrounded by many printmakers and observing their practice helped me understand the nuances of the non-toxic method that Everaert has developed. The large number of students using intaglio meant that the materials and equipment were almost constantly in use during class hours, unlike at the CVA where activity in the printmaking studio is generally quiet. This demonstrated the reliability of the processes and equipment used in non-toxic practice to withstand heavy use. Students were also quick to assist one another, and, despite the language barrier, I had many helpful and clarifying interactions as I adjusted to the new methods.

Evaraert's non-toxic printmaking method is a system of printmaking practices developed to improve safety in the studio without changing the visual characteristics associated with traditional etching. It is a collection of interrelated processes, which have been tested and refined to ensure a reliable and consistent printmaking technique. In order to understand

Evaraert's method as a "whole", one must examine in detail each of the processes used in his printmaking system.

Below is a detailed description of the processes, materials, and infrastructure that make up Evaraert's printmaking method at the Academy in Ghent. The information in this chapter will allow an artist to work with the same processes used at the Academy, assuming that they have access to the same materials and infrastructure.

4.2.1 Studio layout at the Academy for Visual Arts in Ghent

The studio is laid out to keep different processes and materials in their allocated spaces. Work stations are grouped according to function and materials in a way that makes moving from one processes to the next efficient, without impeding students at the other work stations. This layout is possible due to the three large basins, which allow different processes to be used in separate basins.

This is illustrated in Figure 4.4, which shows the layout of the studio. One advantage of this layout is that plate preparation processes take place near a large basin dedicated to this process. The acrylic processes are grouped together, near the hot box where acrylics are hardened and close to the the acrylic ground removal solution. The inking tables and oil cleaning supplies are grouped together so that the activity is kept away from the degreasing area. The paper soaking trays are between the inking tables and the etching presses so that moving from the inking section to the printing section is convenient. Finally, the ferric chloride is in a cornered-off part of the studio, where it cannot interact with other chemicals and where its basin will not be used for other processes. This prevents other substances from mixing with the ferric in the basin or the drain.

The disadvantage of this setup is that the oven for baking heatset ground (described in 4.2.3) is placed far away from the inking table where the grounds are applied.

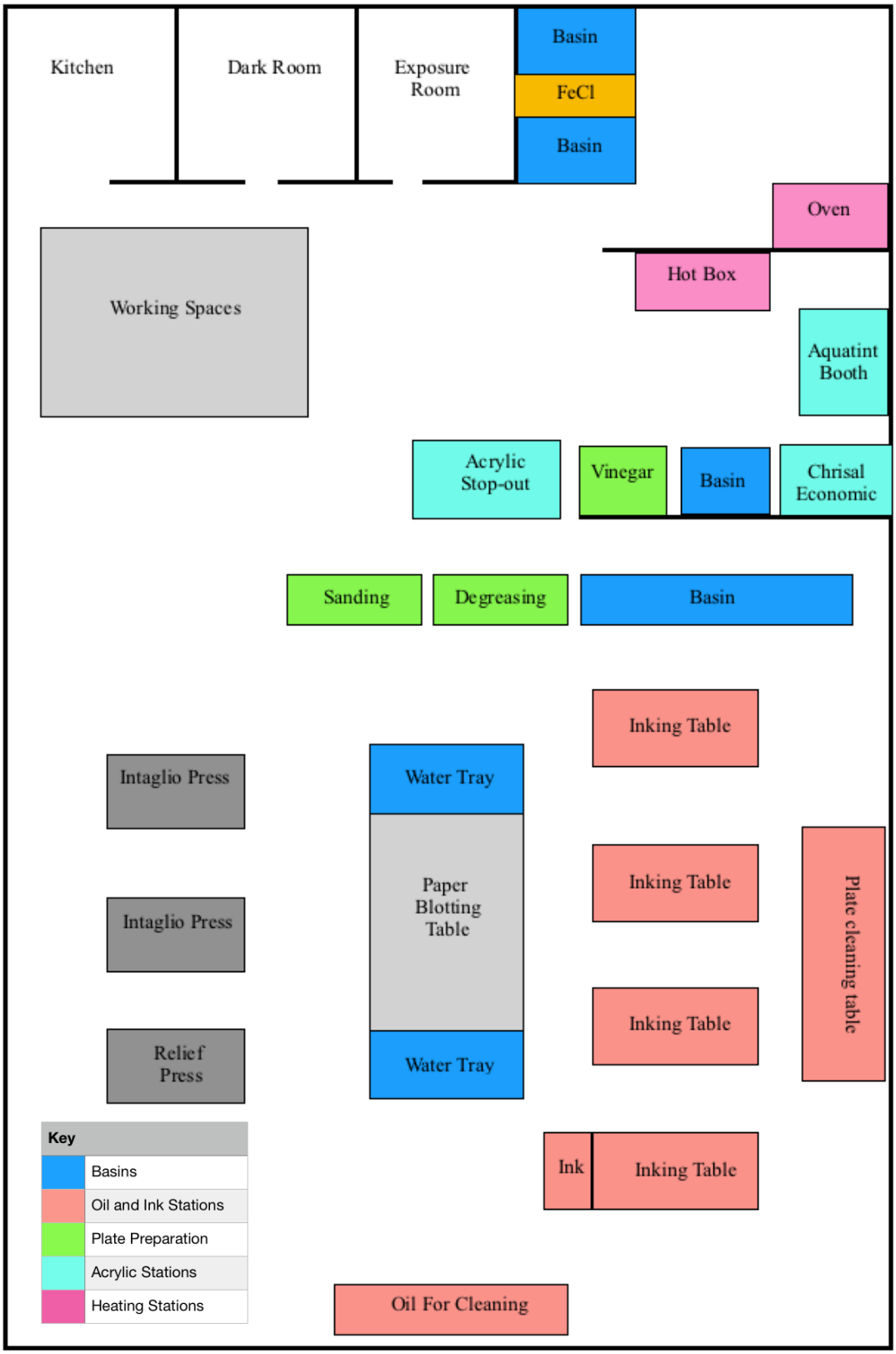

Figure 4.4 Floor plan of the Academy for Visual Arts in Ghent, compiled by Eloff Pretorius (2018)

4.2.2 Personal safety

In non-toxic printmaking, artists still work with hazardous chemicals. Although the number and variety of these chemicals is greatly reduced, safety precautions, such as protective wear, are still an important part of studio practice. At the Academy in Ghent, students are expected to use protective gloves when working with etching materials. Gloves greatly reduce skin contact with any chemicals and must be worn when working with cleaning agents, etchants or inks. Nitrile gloves provide an affordable solution that does not impede movement like some thicker gloves. Latex gloves might cause an allergic reaction for some. Gloves are provided by the school, but students can also bring their own. It is essential that students protect their hands when working with ferric chloride, as this substance is very hazardous if ingested and causes yellow stains if spilt. Gloves should be washed after working with ferric chloride to prevent traces moving around the studio. To reduce this risk, a separate set of communal gloves can also be allocate for use with ferric chloride. Protective glasses are also available for use in the etching area. These are important, as the ferric chloride can splash if used carelessly and cause eye damage. Communal glasses should be inspected daily to ensure that they do not have traces of ferric chloride on them. Students should not wear open-toed shoes in the etching studio in order to protect their skin in the event of a spill. Students should wear aprons to protect their clothing, and long hair should be tied up to prevent it from getting caught in the machinery or coming into contact with any etching materials.

4.2.2 Materials and processes

Plate Preparation

Before a copper etching plate can be used, it must be sanded, degreased and de-oxidised. The sanding provides an evenly-textured surface for the ground to stick to. Degreasing removes oils and dirt from the plate surface, while de-oxidation prevents oxidation from occurring underneath the ground.

Sanding the plates

Start sanding with a 600 or 800 grit paper on a soft surface like wood. Use a spray bottle to keep the plate and sandpaper wet to prevent copper dust from spreading through the stucco. Repeat with a finer texture paper of 1000-2000 grit. This will provide an even surface texture and remove any burrs on the front and back edges. Sand the whole front of the plate evenly, and sand only the edges of the back to prevent confusion between the two sides. Make sure

to remove any protrusions or burrs in the edges and corners to protect the felt during printing. Sand on a soft, clean surface to avoid scratching the plate. Sand the back first. Always wipe surface before and after sanding. Also, wipe the surface and rinse the plate when switching to a finer grit to prevent the rougher dust generated by rougher grit paper from scratching the plate. Sand and bevel with sand paper the corners so that they are not sharp or jagged.

De-oxidising

Once the plate has been rinsed and dried with a soft, clean dish cloth, place the plate in a vinegar and salt solution for +-20-40 seconds. This neutralises any oxidation occurring on the plate (the vinegar will etch the plate if it is left in too long). Figure 4.5 shows the vinegar stored in a large, flat plastic container with a lid, which prevents evaporation and stops foreign materials from entering the de-oxidation bath. Plates are placed in the shallow vinegar solution, and the container can be rocked back and forth slightly to move the solution over the plate. Instructions for using the de-oxidation bath are printed out, laminated and pasted to the lid of the container, reminding students of the correct use of this process. After de-oxidising, the plate is rinsed in water and dried with a clean dish cloth and then place in a hot box.

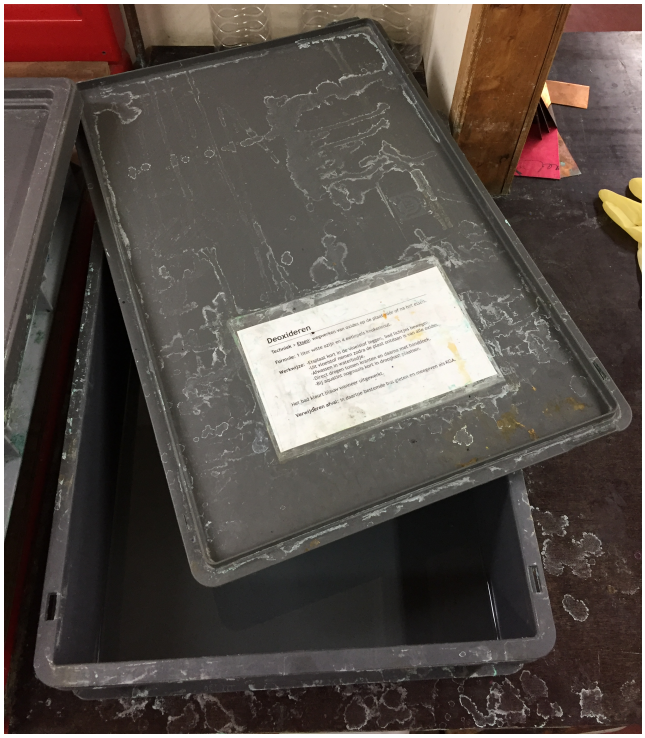

Figure 4.5 De-oxidation bath with lidded container, photographed by Eloff Pretorius (2018)

Degreasing

Soy Sauce is an effective and safe alternative to ammonia and talc powder. To degrease the front of the plate, place a couple of drops of soy sauce on the plate and work it across the surface of the plate with a small, soft sponge. This will dissolve the grease within a few minutes without the need for any chemical cleaning products. After the soy has been spread across the plate and there is no evidence of grease repelling the soy, rinse the plate under running water. Check the plate, and if the water is still being repelled in some places, there is still grease on the plate. If this is the case, repeat the degreasing process. After cleaning an inked plate with oil, it can be difficult to remove the oils in deeper grooves on the plate. With plates that are very oily, a pinch of powder chalk (not French chalk) can be added to the soy sauce and worked into the plate to absorb more oil. Make sure to rinse well afterwards and ensure that all the chalk particles are removed from the plate. A plate that has not been properly degreased will cause the hard ground to break down and create an unpredictable tonal effect.

Plate backing and edges

This process protects the back and edges of the copper plate from the mordant. To apply an acrylic plate backing, place the plate facedown on four small, soft, dry, clean sponges. Use an acrylic such as Lascaux or equivalent and place several drops on the back of the plate. Use a glazing brush to work the acrylic around on the plate, avoiding the edges. Once the centre of the plate is sufficiently covered, work outwards from the centre to the edges, ensuring that they are covered. Never brush inward from the outside, as this will deposit acrylic onto the front of the plate. Alternatively, use clear sellotape to laminate the back of the plate. Edges can be protected with an acrylic stop out or the same acrylic used on the back.

4.2.3 Hard ground etching

The Academy in Ghent uses Baldwin Intaglio Ground (BIG) as their primary hard ground. This is an oil-based heatset ink that can be applied in a thin and even layer on the etching plate using a hard roller. It provides a very durable protective coating to the copper plate and is easy to draw through, allowing the artist to create free flowing lines as seen in Figure 4.6. The BIG ground does not contain harmful toxins and can be cleaned off with vegetable oil

before it has been heated and removed with a non-toxic, environmentally friendly paint stripper or strong probiotic cleaning agent after heatsetting.

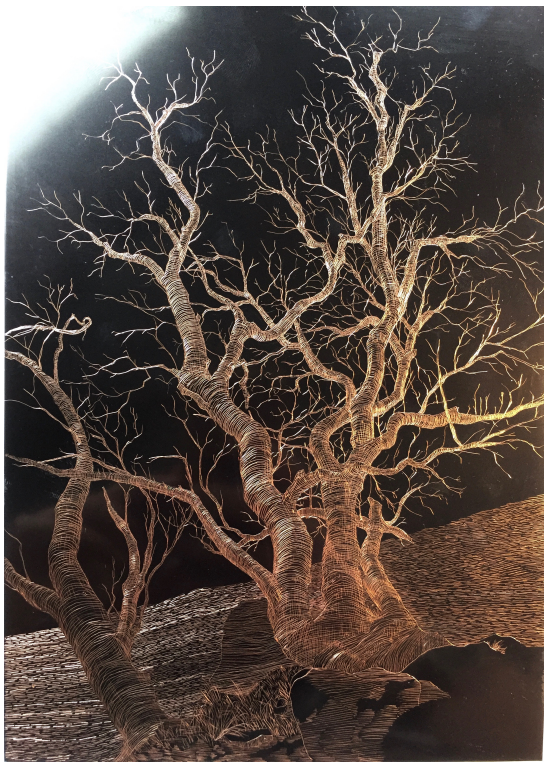

Figure 4.6 Copper plate with Baldwin Intaglio Ground, photographed by Eloff Pretorius (2018)

BIG ground is best applied to the plate with a hard rubber roller. Make sure that there is no dust, ink or residue on the working surface. After working the required amount of ink thoroughly with a pallet knife to loosen it, roll out a thin slab of ink on a glass inking table. Make sure that the ink is evenly applied to the roller and then roll the ground out onto the copper plate. Gradually build up the layer until an eggshell texture develops on the plate. Roll vertically, horizontally, and diagonally to ensure that there is an even application. Regularly return the roller to the slab and make sure that the roller has an even application of ink. Place the plate in a preheated oven at 135 degrees celsius for 10 minutes. The heating process sets the ink and makes it resilient. If the ink has been applied too thickly, the 10-minute heating time will be insufficient for it to harden and the ink might not withstand drawing and etching. One can also use a hotplate to set the ground. When using a hotplate that does not indicate temperature, a series of test plates should be created to determine the correct time and temperature to harden the ground. Place the plate with BIG ground applied onto a preheated hotplate and wait until it loses the tacky consistency and hardens. If heated too much, the ground will become brittle and may flake off in the drawing or etching process. After the allocated time, remove the plate from the oven with a pallet knife, spatula

or other tool, being careful not to burn yourself. Allow the plate to cool and set for at least 30 minutes before drawing, although some recommend it sits overnight. The hardness of the ground allows for preliminary drawing with a soft pencil.

Re-etching hard-ground plates

To re-etch a plate, use the red variant of the BIG ground, which is semitransparent and allows you to see the marks already etched on the plate. Work some ink on a glass inking table with a spatula until loose. Work the ground into the plate with a soft rubber tool, making sure that it fills all the etched lines. Wipe off excess ground with rubber tool and roll up a slab of ground with a hard roller. Roll the ground over the plate, gradually evening out the application of ground until a thin eggshell texture is achieved. Bake the plate for 10 -14 minutes. The thicker application requires more time to bake and to set.

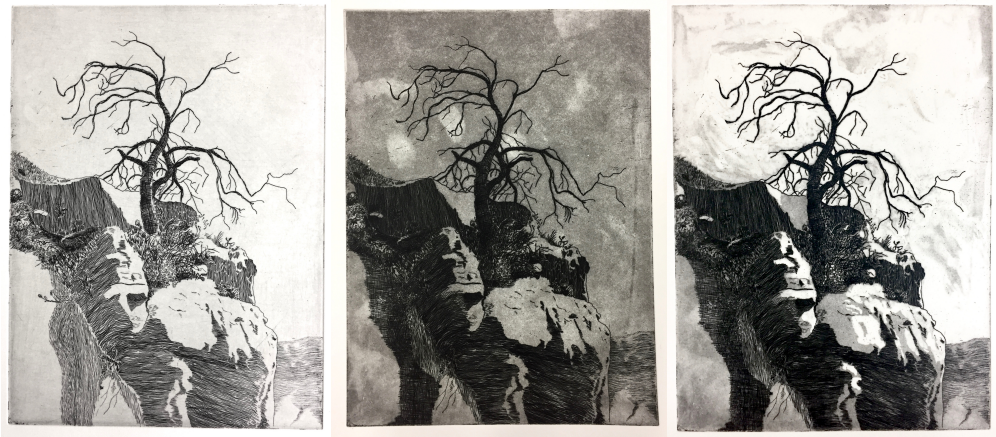

Figure 4.7 Hard ground etching (left), failed hard ground re-etching (centre), Lazy Mezzotint (right), photographed by Eloff Pretorius (2018)

Pictured in Figure 4.7 is an example of a plate (left) before it was re-etched and after (centre) it was re-etched. In this case, I did not degrease the plate properly and the residue grease caused the second application of BIG ground to dissolve in the etchant. This resulted in an inconsistent mid-tone texture developing across the plate and a loss of detail in the fine lines. It is important that an artist work patiently and methodically to achieve reliable results.

Lazy mezzotint

‘Lazy Mezzotint’ is the name Everaert coined for a technique where acrylic mediums are used to temporarily fill in texture on an etched plate. The application of this acrylic can either lighten an area of tone or line or cover up unwanted marks and tones. A thick, even layer of acrylic medium has no texture and will print white. An example of this technique

can be seen in the right frame of Figure 4.7. After the second application of hard ground failed and created a mid-tone across the plate, thin layers of acrylic medium were carefully painted onto the plate to lighten the unwanted mid-tones and restore the plate's highlights. The acrylic layer breaks down slowly in the printing process, which reduces the number of consistent prints and artist can produce in the edition. The number of consistent prints depends on the thickness of the acrylic application and the pressure of the printing press, as the acrylic will gradually wear down to reveal the copper underneath.

4.2.4 Soy wax soft ground

Figure 4.8 Example of soft ground etching, photographed by Eloff Pretorius (2018)

Soft ground can be made using soy wax and lithographic ink in a mixture of 55% wax to 45% ink (measured in weight). The ink used must be a stiff lithographic ink like Charbonell Vignette Black or Graphic Chemical Senefelder's Crayon Black Lithographic Ink. To mix 100 grams of soft ground, place 55g of soy wax and 45g of ink in a glass jar. Warm the jar in a hot box or heated container until the contents have melted and can be mixed together. Use a mixing tool to thoroughly mix the ink and wax together and reheat if it starts the thicken before mixing is complete. Everaert uses a small electric blending tool intended for making cocktails, which works very well for mixing ground. Once the mixture is ready, pour it out into a rubber ice tray and allow to cool. Once cooled the small grounds can be wrapped in foil and stored in a container. Mark the date on which the grounds were made on the container, because the soy wax can oxidise after 6 months. If the ground starts breaking down after some months of storage, it may have oxidised. For this reason, it is best to buy small quantities of fresh wax and mix small batches when needed. The mixing tools can be cleaned by storing them in a hot box or heated container on some newsprint. The wax will run off and the tools can be wiped down while hot.

Materials Required:

- 55g Soy wax (not older than 6 months)
- 45g Charbonell Vignette Black or Graphic Chemical or Senefelder's Crayon Black Lithographic ink.
- Digital scale
- Glass bottle big enough for mixing the ingredients
- Hotplate
- Thermometer

Application of soft ground

Place a sheet of newsprint larger than the copper plate onto the hot plate and place the copper plate on the newsprint. Set the hot plate to the melting point of the wax and allow it to warm. Once it is warm, unwrap one of the soft grounds and spread it across the plate. Use a clean roller to spread the ground evenly across the plate. If the copper is still visible, the layer is too thin. If the ground develops an uneven orange peel-like texture, it is too thick. If the ground is repelled in some places, the plate may not be properly degreased. If it starts to make small open spots exposing the copper, the plate may be too hot. Once a smooth, even ground has been applied, the plate can be removed and allowed to cool. Do not touch the ground as it will pick up marks from any contact.

The ground can be drawn into directly with an etching tool, through standard computer printing paper with pencils, or through a combination of computer printer paper and tissue paper. The hardness of the pencil will affect the tone of the mark transferred, with hard pencils creating a darker, denser mark than soft pencils. The print seen in Figure 4.8 was etched in 12 Baumé ferric chloride for 25 minutes to achieve a good tonal range without losing dark tones.

Figure 4.9 Cleaning soft ground off a copper plate with heat, photographed by Eloff Pretorius (2018)

Once the plate has been etched, it can be cleaned by heating up on the hot plate and wiping down thoroughly with a clean, soft rag, as shown in Figure 4.9. Rubbing alcohol can also be used to remove any remaining residue and for cleaning the rollers.

4.2.5 Aquatint

Figure 4.10 Example of airbrush aquatint, photographed by Eloff Pretorius (2018)

Aquatint tones like those in Figure 4.10 can be achieved through the use of an airbrush and an acrylic medium. By spraying a fine layer of this medium onto the plate, one can create a fine network of acrylic that will form little islands of texture. Acrylic medium is often avoided by airbrush artists since it dries quickly and is very difficult to remove once dry. However, with careful use and thorough cleaning of the airbrush system, airbrush aquatint

can be a very versatile and easy medium to use. The traditional aquatint process poses several hazards, including the use of rosin dust, the open flame used for melting the dust, and the fumes given off in this melting process.

The airbrush system requires the following equipments:

- Bottom fed Badger airbrush with adjustable nozzle
- Air Compressor
- Spray box with extractor backing
- Magnets to attach a large sheet of white paper behind the plate
- Stand for the plate
- 2 tubs of water, one soapy, one plain
- Toothbrush
- Acrylic Aquatint Medium

Acrylic Aquatint Medium Recipe:

- 12 ml Golden Mediums GAC-100 Multipurpose Acrylic Polymer #3910-7
- 1/4 ml Golden Airbrush Medium #3535-5 optional
- 80 ml Future Floor Polish (clear watery polymer based acrylic floor polish)
- 32 ml India ink
- 1/4 ml Winsor & Newton Flow Improver

The aquatint medium used at the Academy in Ghent is made of the ingredients listed above. These give it the strength and fluidity that it needs to create a fine mist when sprayed, while being strong enough to resist the etchant. The aquatint spray booth in Figure 4.11 is comprised of a wooden box with a fine mesh backing and extractor fan. The extractor fan prevents particles from swirling around in the air in the box and protects the user from inhaling the particles.

Applying an Airbrush Aquatint

Hang up a paper backing and switch on the extractor fan and compressor. Place the dry, degreased plate on the stand. Attach the bottle with acrylic medium in to the airbrush. Test

the spray on the paper backing and adjust the nozzle until the flow is consistent, fine and very light. Hold the brush 30-40 cm from the plate. Begin spraying above the plate and work very slowly from left to right and back, lowering the brush slowly with each pass. You will probably not be able to see much change on the plate surface. Use the paper on either side of the plate as an indictor of the ink deposited onto the plate.

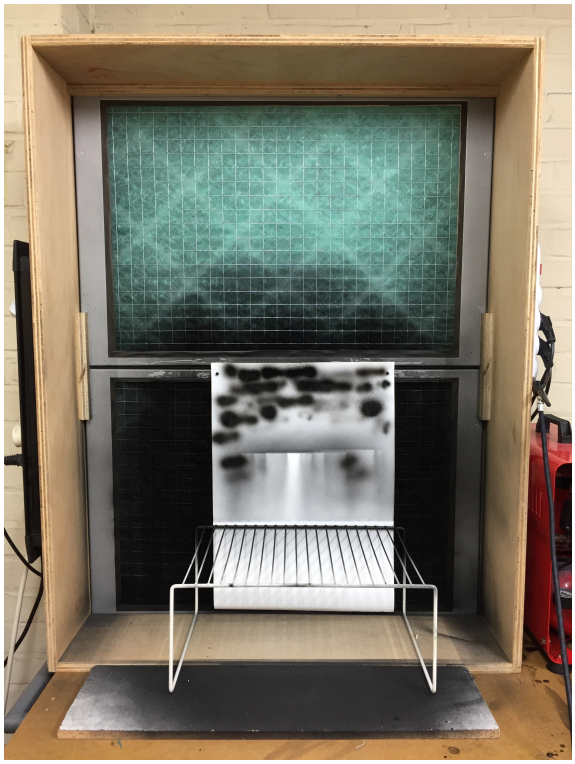

Figure 4.11 Aquatint spray booth, photographed by Eloff Pretorius (2018)

After two full passes of spraying the plate, store the airbrush with the nozzle in the open position and check the plate under good light with a magnifying glass. Check the left and right sides as well as the middle, ensuring that the application of acrylic particles is consistent. Return the plate to the stand and repeatedly spray until the desired density is achieved. The acrylic particles should be as numerous as possible without touching one another. A dense network of separate particles as seen in Figure 4.12 under 20x magnification. The right density will be achieved with practice. Once the plate is done, place it in the hot box for 20 minutes to dry and set. Clean the airbrush immediately.

Cleaning the airbrush

Remove the bottle of acrylic medium from the airbrush and rinse the airbrush in clean water. Spray the brush with the feeding tube submerged. This will draw water through the brush

and flush out the acrylic. Adjust the nozzle as you spray so that all positions are cleaned. Place the tube in the soapy water and spray the brush. Adjust the nozzle and spray until all ink is removed in all positions. Spray brush and allow soap foam through. This will clean the inner tube. Rinse again in clean water and spray until all water is removed in all positions. Hold upside down to remove water in tube, pat dry and store.

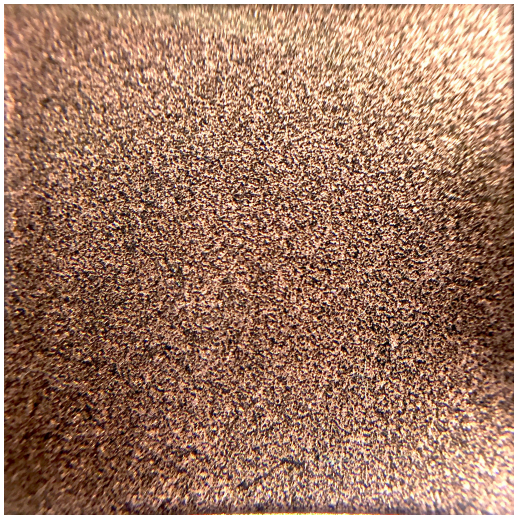

Figure 4.12 Acrylic aquatint particles on a copper plate under 20x magnification, photographed by Eloff Pretorius (2018)

4.2.6 Cleaning

At the Academy for Visual Arts Ghent, cleaning is done using vegetable oil, a vegetable cleaning agent, and a strong probiotic cleaning agent developed for cleaning horse stables. By removing solvents from the cleaning processes, the studio does not require a large extraction fan system to remove the solvents from the air. Without the presence of solvents, the studio becomes a far more pleasant working environment and artists do not need to worry about the air that they are breathing in.

Removing the ground and stop out

The Academy for Visual Arts Ghent uses a strong probiotic cleaning product called Economic[1], developed for cleaning animal stables and manufactured by the company Chrisal. It breaks down strong acrylics like Lascaux, acrylic stop-out, aquatint mediums, and the hardened BIG ground in around 30 minutes, as seen in Figure 4.13. Chrisal Economic is stored in a lidded, flat container near a sink. Plates are placed in the solution and left for 30

[1] Chrisal products are distributed by Hychem in South Africa. Chrisal Economic is called Super CMF 240 by Hychem.

minutes or longer. A cleaning brush can be used to agitate the dissolving grounds, and once the plate is clean, a squeegee is used to remove as much of the Chrisal Economic as possible before the plate is removed from the container and rinsed with water. The product can also be applied with a spray bottle in smaller studio settings where a cleaning bath is not used regularly.

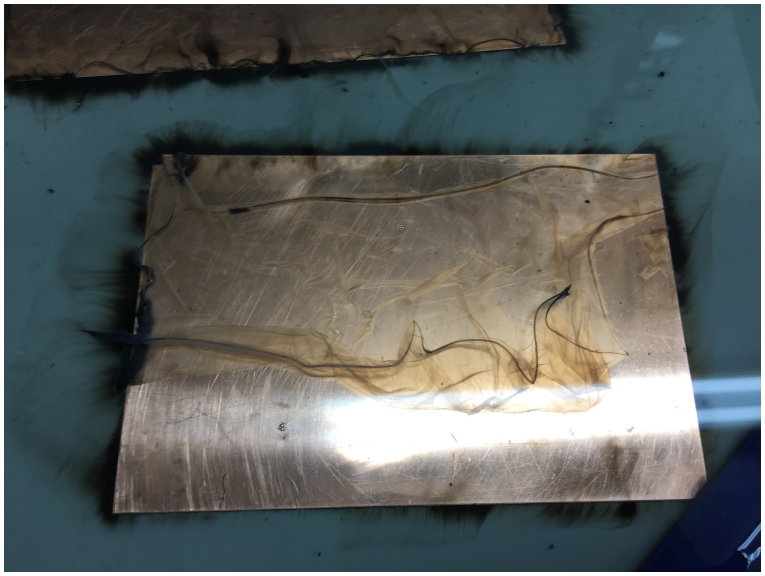

Figure 4.13 Acrylic medium dissolving in Chrisal Economic, photographed by Eloff Pretorius (2018)

The cleaning bath will quickly become black and full of acrylic particles, but the product will continue to work for a long time. The most important factor in maximising the use of the cleaning product is preventing evaporation by storing it in a lidded container that remains closed when not in active use. This will allow a 5-litre bottle of Chrisal Economic to serve a busy studio like the Academy for Visual Arts Ghent for more than six months, making it a very efficient choice.

The inking table

Vegetable oil is the primary cleaning product used to clean surfaces and equipment that contain oil based inks. Vegetable oil dissolves the dense pigments in oil-based inks and makes them easy to wipe away. A scraping tool should first be used to remove excess ink from the table. Wipe the ink into some newspaper and discard. Once most of the ink has been removed in this manner, a few drops of vegetable oil can be applied to the surface. These drops are then worked around the surface until all remaining ink is loosened.

The oil can then be removed from the tables using a vegetable cleaning agent (VCA) and finally, the remaining residue can be removed with some powder chalk. This absorbs the oils and leaves the table clean for the next user. An important aspect of the cleaning procedure is storing the three cleaning supplies and the rags used to apply them in separate, labelled containers, laid out in a sequential manner that reminds students of the correct order in which to use the cleaning materials. Figure 4.14 shows the oil stored in uniform bottles with small lids that allow small quantities to be released in a controlled manner. These bottles are kept in a container next to the oil rags.

Rollers are cleaned in a similar manner. Firstly, the excess ink is removed from the roller by rolling it out onto some newspaper. Then a couple of drops of oil are worked around the roller with an oily rag. A cleaner rag is used to remove the oil. Vegetable cleaning agent is applied and worked around the roller in the same way. Then a rag with powdered chalk is used to remove the oil and residue, and finally, a damp sponge is used to remove any chalk left on the roller. Rollers are always inspected by staff before being returned to storage to ensure that they have been cleaned properly. No metal object or any hard object with a sharp edge should be used on a roller as it will damage the rubber.

Figure 4.14 Labeled containers with oil, rags, and vegetable cleaning agent, photographed by Eloff Pretorius (2018)

Cleaning an inked plate

Once a plate has been inked and printed, it can be cleaned using vegetable oil. Place the plate on a piece of newspaper in the allocated plate cleaning area, apply a couple of drops of vegetable oil onto the plate and work it around the plate with a brush, making sure that the oil is worked into the etched lines as seen in Figure 4.15. Leave the plate for 5 minutes. Agitate the oil again, checking to see that the ink in the lines is dissolving. Use a rag to wipe

away the oil. If the lines are still full of ink, repeat the process. Once the plate is clean, apply some dish washing liquid to the plate and work it into the lines over a sink. Gently wash the plate until it is clean. The plate will need to be thoroughly degreased before any further etching is added. However, it can be safely stored or re-inked in this state.

Figure 4.15 Cleaning an inked plate with vegetable oil, photographed by Eloff Pretorius (2018)

4.2.7 Ferric chloride

Ferric chloride is used in five etching processes: aquatint, hard ground, soft ground, spit bite and etched photopolymer intaglio. All of these processes are done in one allocated area with three large, shallow basins, as seen in Figure 4.16. There are two types of baths in this area: a vertical bath used for hard ground and two horizontal baths for aquatint and soft ground. The baths remain covered when not in use to prevent evaporation. All plates are rinsed on a wooden platform in the middle basin with a hose where the diluted ferric chloride runs down the drain. Health and safety inspectors have not protested this aspect of the studio's operation. As the image illustrates, this area is messy. There is a notable amount of ferric chloride dust in and around the basins, which presents a potential health hazard as the dust can easily get onto clothing without the artist noticing. The presence ferric chloride dust particles could be harmful if ingested or inhaled. However, with the use of gloves, glasses and aprons, this risk is minimal.

The vertical bath reduces evaporation dramatically and prevents residue from building up on the plates when they are submerged for extended periods of time. To use the bath, plates are attached to a long piece of sellotape, which is pegged to rim of the bath with a washing peg

once the plate is submerged. The advantage of the vertical bath is that the copper particles dissolved in the ferric chloride during etching sink away from the plate instead of slowing down the corrosion by filling the areas where the reaction is taking place. As the ferric chloride bath is used over time, the build up of copper particles will saturate the solution and gradually slow down corrosion. When the bite times become significantly longer, the old ferric chloride is replaced with a new mixture.

Figure 4.16 Ferric Chloride baths and plate rinsing area, photographed by Eloff Pretorius (2018)

The old ferric chloride is mixed into a container with a soda ash solution that neutralises its acidity. The containers are stored beneath the basins in secondary containers, in case the primary container fails, until they are handed over to a hazardous waste removal company. Each container is labeled with the correct safety data sheet to prevent confusion and ensure that the hazardous waste disposal company knows what chemical they are dealing with.

At the Academy in Ghent, there has only been one emergency case when a student got ferric chloride in his eye. The student immediately screamed, intentionally alerting the other students and staff that there was an urgent situation. An ambulance was called immediately while the student was assisted in flushing his eye with running water. Speedy action was possible because there was infrastructure for communicating the emergency and uniting the people present in the studio to ensure that the affected student received appropriate care. The student suffered no lasting harmful effects after the accident. The primary hazard in the non-toxic etching space is the ferric chloride, which is highly poisonous if ingested and can

damage the eyes. However, the use of gloves, strict bans on eating and drinking in the studio, and a well-designed emergency protocol will keep this hazard in check.

Spit Bite

Spit biting is done with a mixture of gum-arabic and ferric chloride. A spit bite kit comprised of these two substances in glass bottles with lids, brushes, small lids to be used as pallets, and safety glasses is stored away in a plastic tray. The spit biting is done in one of the etching basins as seen in Figure 4.17. The artist must wear gloves, goggles and an apron. This process is especially dangerous, as the ferric chloride is handled with a brush and thus, extra care should be taken to avoid spilling, flicking or unconsciously spreading the ferric chloride. The plate should have a very fine and dense aquatint applied. The spit biting can then be applied with the brush to the plate in an allocated etching space, preferably in a basin or large container so that any spillage is contained. Water should be ready for rinsing the plate and dirty brushes. All equipment should be throughly rinsed after use.

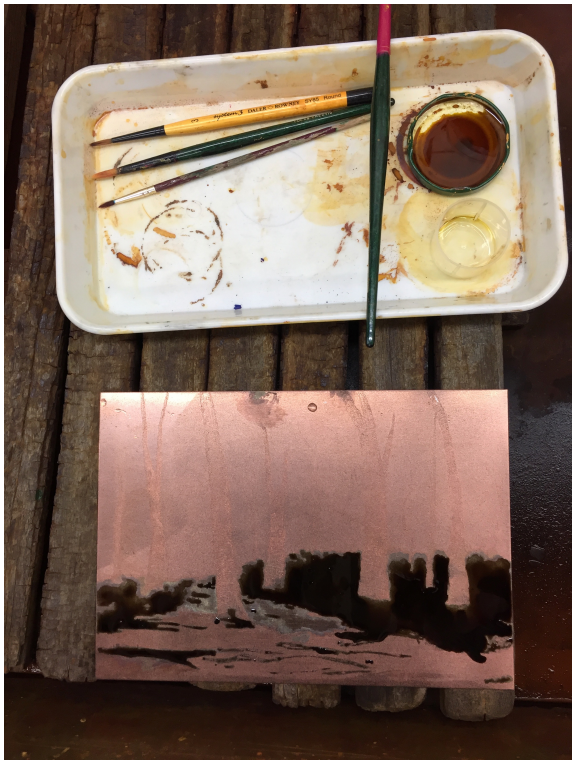

Figure 4.17 Example of a copper plate in the spit biting process, photographed by Eloff Pretorius (2018)

4.2.8 Photopolymer non-etch intaglio-type

This intaglio process was developed by Keith Howard (1998) and allows artists to print photographic colour images using intaglio processes and materials. Printing colour images can be done through a colour separation process that divides a digital image into cyan, magenta, yellow and black layers. Prior to visiting the Academy for Visual Arts Ghent, I had not planned to include a section on this process, but having had the opportunity to work with photopolymer and realising the ease with which digital images can now be incorporated into the etching aesthetic, I felt it was an important inclusion.

CMYK Colour Separation Intaglio Material List:

- Dry Film Photopolymer sheet
- Four identical degreased and sanded copper plates
- Darkroom
- A water tray half-filled with clean water
- Water tray half-filled with 1/10 soda ash solution
- Glass cutting surface (wet)
- Sharp crafting knife
- Etching press
- Hairdryer
- UV exposure light
- Vacuum bed
- Transparency for printing positives
- Computer with Adobe Photoshop CS

Cutting the plates

Everaert uses 0.55mm thick copper to save on cost. However this does not work for larger plates as they can warp and deform easily. A 1mm plate thickness is recommenced for plates larger that A4 in size. Use a T-square to check the corners, marking the squarest corner and measuring from that corner. Measure out the dimensions of the required plates. Make sure that they are all the same size. Cut the sheet using a guillotine. Magnets can be used to control the size of the plates, by using them as a stopper to ensure that the plate does not shift during cutting. As the plates are being cut, make sure to place them face up and orient them in the same way. It is important that they are not rotated, as this will reveal any discrepancies in their size or shape during printing. Mark the back bottom left corners or each plate with an etching needle so that the plates will not become incorrectly oriented in the exposure processes or during printing.

Formatting the digital image

1. Open the selected image in Adobe Photoshop, change the image format to TIFF, and change the MODE to CMYK. Set the picture size, first locking the length and width ratio, and then set the resolution to 300DPI. Change the image size in centimetres to be slightly larger than the dimensions of the copper plate. Save the image as CMYK (Title) DPI300.tif

2. Set the image curves. If the curve is at 100% darkness, no light will reach the dark areas of the image when exposing the plate, which will create an open area without any texture that will not print black. Thus, the curve should be lightened so that the darks are exposed to some light and harden slightly to provide texture to hold ink when printing. At the Academy in Ghent they set the curve to 90% for the HP ink photo printer used. The printer must print in pure black, not a CMYK black. Save as CMYK (Title) DPI300 C90.tif to indicate that the curve has been set.

3. Increase the canvas size of the image by 1.5cm, and make sure that the canvas is white and has a C,M,Y, and K value of 0. Use the line tool to make four crosses on the new white border area. These crosses will be used to register the plate. They should be 2-3 pixels in thickness and must not touch the image. Flatten the image. Save as CMYK (Title) DPI300 C90 RM .tif to indicate that the registration marks have been added.

4. Split the channels of the image. Label each channel according to its colour by adding a small text box in the bottom left corner with the corresponding letter C, M, Y, or K. Flatten the image. Save the images separately using the letter C, M, Y, or K to indicate the colour profile of the image. Repeat for each image and save them all separately. Save as CMYK (Title) DPI300 C90 RM (C,M,Y, or K).tif

5. Change the mode of each image to Bitmap. Set the output resolution to 900 pixel/inch. Everaert found that there was no discernible difference between 900 and 1200 DPI. Save as BM (Title) DPI900 C90 RM (C,M,Y, or K).tif

6. Once all of the images are saved in bitmap format, create a new A4-sized bitmap image with a 900 pixel/inch resolution. Paste each of the layers onto an A4 Bitmap 900 pixel/ inch resolution image and save them separately for printing. If the dimensions of the images are small enough, they can be doubled up on one A4 image file to reduce the number of transparency sheets used.

Laminating the plate

Photopolymer film is a photosensitive polymer film developed for etching circuit boards. Images can be transferred onto the film with extreme precision through the photo exposure process. The film is comprised of three parts: a light sensitive emulsion suspended between two protective layers of plastic, a glossy outer layer, and a matte inner layer.

To laminate the copper plate:

1. Cut a section of film that is slightly larger than each the plates by approximately 1 cm on all sides.
2. Half-fill a tray with clean water. Any particles submerged in the water can create unwanted marks on the plate if they are caught between the film and the plate. Submerge the plate in the water.
3. Graze one corner of the inner layer with a knife. Then, roll the grazed area between your thumb and index finger until the inner layer begins to peel away. Place the exposed emulsion corner in the water and slowly peel away the inner layer until the film is floating emulsion side down on the water with no air bubbles underneath it.
4. Slowly lift the plate to meet the photopolymer layer, keeping the floating photopolymer in place with your thumbs as you lift the copper with your fingers. Once they are touching, lift them out of the water and suspend between two fingers by one corner while the excess water drains.
5. Place the plate and film on a sheet of wet glass. Check that there are no air bubbles under the edges.
6. Use a hard squeegee to apply pressure to the film and plate in three cycles of horizontal, vertical and diagonal strokes of increasing pressure.
7. Use a sharp craft knife to cut off the overhanging film.
8. Place the plate on newspaper and use a dry cloth to gently dry the film, working from the middle to the edges to avoid lifting the film.
9. Place the plate on the etching press. Set the pressure to one quarter-turn. Place the plate at a slight angle so that it enters with a corner first and run it through under low pressure. Remove the plate from the press.
10. Heat the plate in the hot box for +-40 seconds or until the plate is hotter than warm but not too hot.
11. Use a very sharp craft knife to cut away the edges of the film. Lean the knife at a 45-degree angle with the blade touching the edge of the plate.
12. Repeat for each plate and store in a dark, dry drawer.

Registration and exposure

Firstly, trace the shape of one of the copper plates as accurately as possible onto a sheet of paper using a grey fineliner pen. Place one of the printed CMYK transparencies onto a light table facing up, ensuring that the vertical orientation is correct. Place the paper face down onto the transparency and line it up so that the borders of the plate outline do not touch the image on the transparency. Using the fineliner and a ruler, trace the registration marks on the transparency. Flip the paper over and retrace the marks. Apply a piece of tape to the top part of the page. This will allow the four transparencies to be attached to the same registration sheet without damaging the sheet. Place the first transparency onto the paper and line it up with the marks. Tape it to the top tape so that it can fold over on a hinge.

Place the sheet in the exposure unit, flip over the transparency and place the first plate onto the sheet so that it is lined up with the registration marks. Flip the transparency over the plate and gently and wipe across to make sure it is lying flat. Close the exposure unit and engage the vacuum bed. Expose the plate. When the exposure is complete, disengage the vacuum bed and remove the plate. Repeat for each colour. Mark the registration page with C, M, Y, and K and cross out each mark after exposure to keep track of the exposure process and mark the back of each plate C, M, Y, or K with a permanent marker to keep track of which plate has which colour layer exposed.

Washing out the emulsion

Take the exposed plate to the dark room and place it in the 1/10 soda ash solution. Before submerging the plate, remove the thin top layer of glossy plastic protecting the emulsion. Use a small piece of sellotape applied to the corner of the plate and pull across to remove the plastic. Submerge the plate in the soda ash solution. Gently wipe the plate in vertical and horizontal motions with a very soft sponge. Once the copper just starts to show through the emulsion, take it out, rinse with clean water and check it in good light. The copper should barely be visible in the most densely washed out area. If too much emulsion is washed out, the small hardened areas will become isolated and fragile. There should still be a thin layer of emulsion covering the copper so that the texture of the emulsion doesn’t break down during printing. De-oxidise the plate in pure vinegar, rinse the plate again and gently dry with a soft cloth and dabbing motions. Harden the developed plate by exposing it under UV light for 10 minutes. The plate is now ready for inking and printing.

CMYK printing

Set up a work station with a separate set of gloves, scrim, inking rubber, cleaning rag, and spatula for each of the colours that will be used. An accurate registration sheet marking the position for the plates and the paper should be taped underneath a sheet of acetate paper that is slightly larger than the printing paper. The registration sheet and acetate paper should be small enough that it clears the roller after the plate has been rolled through the press. A small registration and acetate sheet can be rotated 180 degrees after each run through the press to ensure that the paper always enters the press with the same leading edge. This will minimise potential registration errors due to the stretching of the paper.

Place the etching paper face down on the clean registration/acetate sheet on the press and run the sheet through the press. Tape down the top two corners to create a hinge, flip the page over on the hinge and place the inked yellow plate on the press. Make sure that the plate is perfectly registered (use the mark in a bottom back left corner and make sure it is lined up with the bottom right corner on the registration sheet). Flip the page back over onto the plate. Rotate the sheet 180 degrees and then run it through the press. Gently peel the paper back and flip it over on the tape hinge, remove the yellow plate, and wipe down the registration sheet. Place the red plate on the press and repeat the process, making sure that the registration is perfect and that the paper is rotated 180 degrees before running though the press. Repeat this process for the cyan and black plates. Once the black plate has been run through the press, gently remove the tape hinges before peeling the paper off the plate. Remove the paper and store for drying.

Figure 4.18 The four stages of printing a CMYK image starting with yellow (left) and ending with black (right), photographed by Eloff Pretorius (2018)

The hardened photopolymer can be removed from the copper plate after printing, allowing for the reuse of the copper plates. Once the ink has been cleaned off the plates, they can be submerged in a strong solution of soda ash. Within an hour or two, the photopolymer layer will start to break down and lift off the plate. The plates can then be sanded down and reused.

4.2.9 Conclusion

Marnix Everaert's interest in safe printmaking practice has played an important role in developing safer alternatives to traditional etching processes. His ongoing systematic research since the late 1990s has established a framework for safe intaglio printmaking that draws on the American model established by Keith Howard and applies it to the European context. Everaert's keen willingness to share his research and knowledge with other printmakers around the world has helped to make safe printmaking more accessible globally. His research findings are used at various printmaking institutes in Europe, Japan, America, and South Africa. The techniques and materials used at the Academy for Visual Arts Ghent are faithful to traditional etching aesthetics, and some new techniques allow more creative freedom for the artist.

Everaert's notion that the studio is like a lab where students can learn through experimentation was informed by his trial-and-error research style, and it thrives in the safety of a non-toxic studio environment. The processes and materials used at the Academy, as well as Marnix's open attitude toward experimentation, have created a printmaking culture centred on practice-led research. Students and staff work together to solve aesthetic and creative challenges in ways that introduce new processes and materials to the printmaking discipline.

An etching studio should have carefully-designed and well-communicated safety infrastructure. The infrastructure design should select processes, materials, and systems that minimise the potential for accidents like hazardous spills or contact with hazardous materials. As the senior teacher at the Academy in Ghent, Everaert has established a vision for safe printmaking practice. Everaert and his two colleagues have equipped the studio and their students for non-toxic practice, however, it remains to be seen whether the value for safe practice would continue under different leadership. With Everaert's vast body of research as a foundation, any printmaker could quickly adapt to using non-toxic processes.

CHAPTER 5: DISCUSSION AND APPLICATION OF FINDINGS

5. The nature of printmaking practices at the CVA

5.1 Introduction

This chapter will discuss my experience as a student at the Centre for Visual Arts (CVA) with reference to resources from previous periods in the printmaking department's history. This discussion describes studio practices from 2012 to the present and identifies the traditional intaglio processes used in the studio. The health hazards of traditional practices and materials are discussed in order to establish a framework for hazard identification in use and storage of materials. A series of recommendations are made to remove hazards in the studio by implementing the non-toxic methods researched in this study and described in Chapter 4. The findings are summarised in comparative reference tables.

In my experience, intaglio printmaking practice at the CVA has been centred on traditional printmaking materials and techniques. The studio has been shaped by many lecturers over several decades. Their practice established the infrastructure of the printmaking studio, which is well-equipped for a variety of printmaking processes, including relief, silkscreening, lithography and intaglio. Intaglio printmaking was the subject of my honours research, and has been the means of my practice from 2016 to 2018.

The printmaking archives of the UKZN collection contain old etching plates and prints produced at the CVA from the 1970s to the present. These show a high quality of technique and illustrate the traditional aesthetics of the printmaking discipline. Along with these prints are sets of notes and posters, created by past lecturers, detailing the nature of different printmaking processes and describing the intaglio techniques through which these prints were created. One example of such a resource is Malcolm Christian's Printmaking Technique, a document filled with detailed instructions and descriptions of the four categories of printmaking taught during his time as a lecturer. This document was passed along to Bronwen 'Jinny' Heath when she took over the printmaking program after Christian. In Christian's Printmaking Technique notes there is an extensive description of the properties of papers, materials and techniques, including lithography, relief, intaglio and screenprinting. This document and my undergraduate and honours printmaking education are the basis of my understanding of the historical nature of intaglio printmaking and the materials used in this practice at the CVA. Although these have been several other printmaking lecturers in the interim, I have not had access to documentation on their practices.

In the intaglio section of Christian's Technique there are detailed instructions outlining each aspect of the etching processes and the materials used, as well as their properties and applications. There is little reference to safety precautions for using any of these materials other than a table with formulas for mixing the acids, which includes a column showing the gasses generated by the various acids and a brief section on the general characteristics of acids which reads as follows:

> 1.3 Acid is very dangerous. It must be remembered that when mixing an acid solution, acid is always added to the water and not vice versa. This would create an enormous amount of heat which is likely to explode the glass bottle.
> 1.4 Good ventilation in the workroom is essential as fumes from an open bath can be harmful to the lungs.

The document includes ferric chloride in its list of mordants for etching, noting that it is a corrosive chemical rather than an acid and that plates should be etched upside down to avoid iron oxide sediment building up in the bitten lines, a problem that can also be solved with the use of the Edinburgh Etch or a vertical bath. There is no reference to the hazards of incorrect storage of chemicals, airborne particles from rosin aquatint, or the use of solvents.

My knowledge of the intaglio printmaking materials and processes used at the CVA was established through my undergraduate and honours studies at the CVA. In the second year of my undergraduate program, I was introduced to etching with traditional materials. In my class's first etching assignment, we worked with zinc plates, nitric acid etchant, hard ground, bitumen stop out and turpentine. Safety measure taken when working with these materials included the wearing goggles, using a lab fume cupboard when working with the etchant, wearing aprons, and wearing closed shoes in the studio. Subsequent projects introduced copper plate etching, drypoint, burnishing, spray-paint aquatint and dutch mordant etchant. There were no accidents or hazardous instances that resulted in injury during this program. However, we were not provided with gloves and often cleaned our hands with turpentine after working with inks or bitumen.

At the time I was concerned with the effect that the printing materials and processes were having on my hands. The frequent use of turpentine, acids and inks caused dry skin and a yellowing discolouration on one of my fingers. According to nitric acid's MSDS file, a yellow or brown discolouration of the skin is a result of severe irritation (Protea Chemicals 2017). I remember very distinctly feeling worried about the effects of these substances on

my hands. The second-year etching program was not long, lasting only a few weeks, and I produced two etching plates in total.

During this period there was very little intaglio printmaking taking place at the CVA. Second year classes had an introduction course for the medium, but most students did not continue etching later on in their degrees. There are various factors that contributed to the decline of printmaking at the CVA during this period, one being the absence of a printmaking specialist on the staff in 2015. This left a gap in knowledge between previous printmaking lecturers and the current lecturers, which was haphazardly filled in by students such as myself.

In 2016 Dr. Kathy Arbuckle joined the CVA staff and began reinvigorating the printmaking program. Arbuckle's background in printmaking and interest in restoring the printmaking studio and curriculum motivated me to make printmaking the focus of my honours research and practice. Arbuckle arranged workshops and etching sessions with printmakers and retired printmaking lecturers. This input gave me the opportunity to master traditional printmaking techniques and establish an understanding of traditional etching aesthetics.

Over the following two years, the printmaking department gradually gained momentum as Arbuckle made more knowledge, materials, and finances available to students. This momentum lead a group of students to attend a non-toxic intaglio workshop at the Caversham Press in 2016 with Marnix Everaert and Malcolm Christian. This workshop revealed that the intaglio materials and processes we had been using at the CVA were hazardous and that there were alternatives that minimised these hazards.

Over the course of this research, my practice has tested and introduced many of the non-toxic materials and processes found in the literature and observed at the Academy in Ghent. The CVA has supported this research and provided non-toxic materials, including the ingredients for Edinburgh Etchant, an airbrush system, and various cleaning materials. As this research comes to an end and my presence in the CVA studio space ends, it is important to establish a comparative analysis for future reference. The following analysis examines the hazards of traditional materials which have been used at CVA and are still present in storage or in practice. The goal of this analysis is to establish an understanding of the chemistry of traditional and non-toxic etching materials so that the safest accessible materials can be identified and used at the CVA. The information describing these hazardous materials has been summarised in a series of quick-reference tables at the end of the chapter.

5.2 Studio layout at the CVA

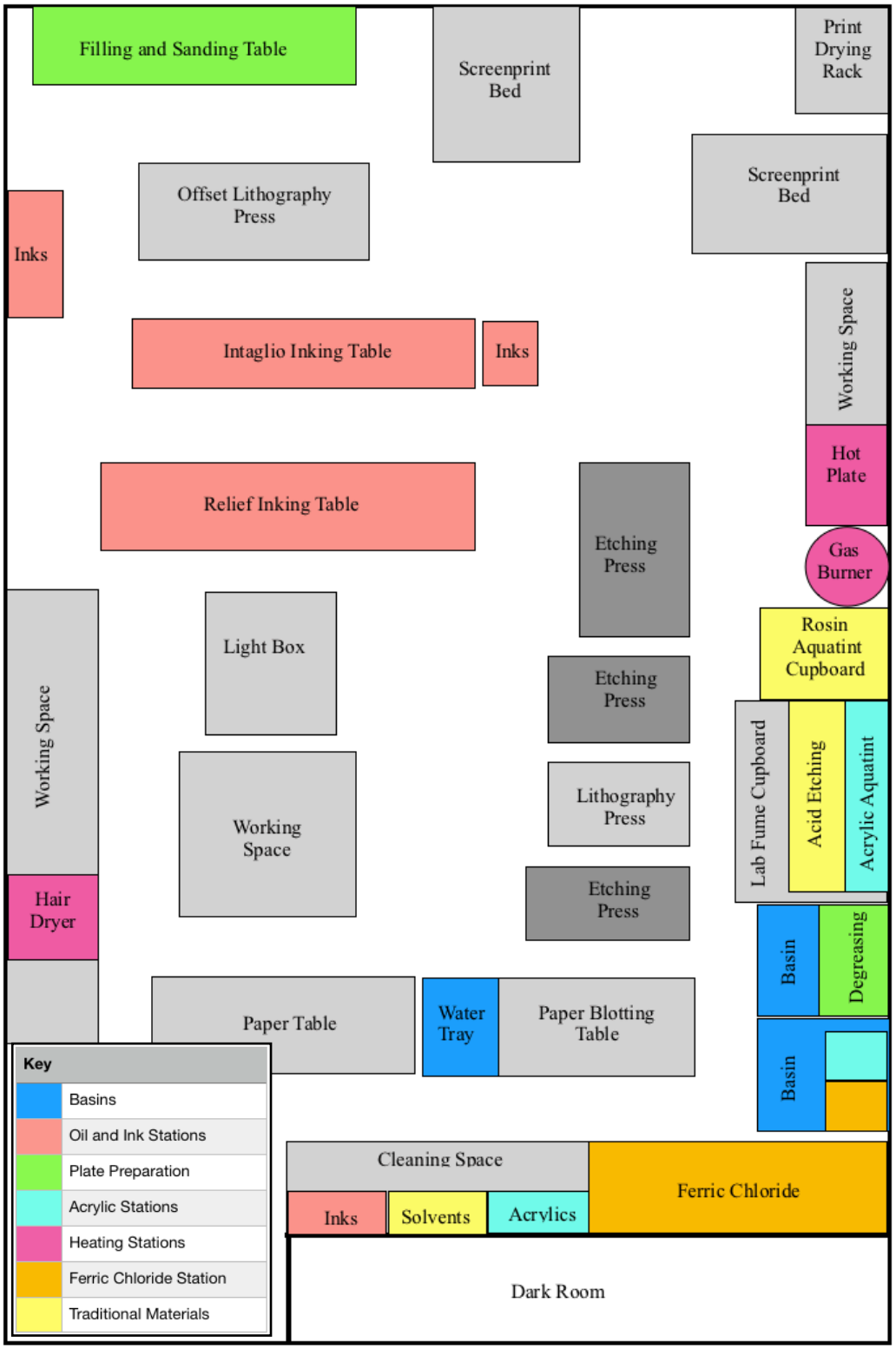

Figure 5.1 Floor plan of the Centre for visual Arts, compiled by Eloff Pretorius (2018)

The CVA printmaking studio currently has an overlap of intaglio infrastructure and materials for both traditional and non-toxic printmaking. The floor plan in Figure 5.1 appears more crowded than the floor plan for the Academy in Ghent in Figure 4.4. The reasons for this is the much smaller size of the CVA studio building and the inclusion of both traditional materials and infrastructure and the new non-toxic processes and materials that have been introduced through this research.

This floor plan shows that the processes at the CVA are grouped according to fume extraction infrastructure and the use of the basin. All of the cleaning processes are grouped in the bottom cleaning space under an extraction hood and near the large basin in the bottom right corner. Processes that release gases or acrylic particles are grouped in the lab fume cupboard and are close to the basin so that cleaning and rinsing can be accessed easily. The inking tables are centrally-located, next to the etching presses and near the paper soaking and blotting station. This layout works well within the space to keep intaglio processes close to the appropriate infrastructure and out of the way of the screenprint areas.

There are two disadvantages to this layout: the filing and sanding table in the top left hand corner and the cramped bottom right corner where a large number of activities take place. This may cause the basin area to become crowded by a group of students simultaneously engaged in plate preparation, etching, cleaning, and applying or removing acrylics.

5.3 Identifying hazards in traditional practice at the CVA

The printmaking studio is a space where art intersects with chemistry. This has many creative benefits and enables artists to work with complex printing systems like etching, photopolymer and screenprint. In order to develop a deeper understanding of the various materials used in intaglio printmaking, I have compiled an analysis of the traditional processes and materials used for etching at the CVA. This analysis establishes an understanding of the chemistry of traditional etching materials and the nature of their chemical reactions with one another. Understanding these characteristics is part of my analysis of the printmaking system as a series of interrelated elements within the studio environment. Following each analysis is a recommendation for alternative methods and materials, based on my findings in Chapter 4, that would improve studio safety.

5.3.1 Solvents

The CVA has a well-equipped etching studio with two extraction units. One unit covers three working spaces: a basin, a washing station, and a working surface. This extraction system deals with fumes from cleaning processes using turpentine, thinners, and ammonia (Figure 5.2). The second unit is a fume cabinet with a sliding glass door. The extraction units play an important role in removing vapours that result from printmaking practice.

Turpentine is used primarily for diluting oil-based ink in mono-print processes and for cleaning equipment such as rollers and inking tables. There are three risks when using turpentine: flammability, excessive inhalation, and violent chemical reactions with acids and oxidising agents. The vapour produced when cleaning with turpentine is very heavy and will sink to the floor of the working space[2].

Figure 5.2 CVA extraction system covering the cleaning area and basin, photographed by Eloff Pretorius (2018)

Turpentine reacts violently with oxidants, halogens and mineral acids (International Program on Chemical Safety, 2002). Nitric acid and hydrochloric acid are both mineral acids stored in the studio and sometimes in the same room as turpentine. Any spill of these substances near one another could result in hazardous chemical reactions. Turpentine should be stored in closed containers, separated from acids, and in a well-ventilated room in a fireproof area as is indicated in Figure 5.8. Turpentine forms toxic gases such as carbon monoxide and other by-products when it burns.

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[2] Evaporated turpentine has a relative vapour density of 4.6 - 4.8 meaning that it is more than four times heavier than air. The flash point (lowest temperature at which a liquid can form an ignitable vapour in air) of turpentine is 35°C (International Program on Chemical Safety, 2002). Turpentine is a serious explosive / fire hazard when used in large quantities during summer printing classes at the CVA.

5.3.2 Non-solvent cleaning

The CVA can use vegetable oil, vegetable cleaning agent, and powdered chalk for cleaning inking surfaces, rollers, and plates. This would remove the majority of solvents used in the studio. An allocated cleaning station with oil, brushes and rags (as observed at the Academy in Ghent in Figure 4.14 in Chapter 4) would improve the safety of the cleaning processes. A useful practice at the Academy in Ghent which may benefit the CVA is that students bring rollers they have cleaned to the staff for inspection to make sure that no unwanted residue is left on the rollers before they are stored.

Plascon RemovALL is a non-toxic all purpose paint remover. It is affordable and accessible in South Africa and very effective at removing any acrylic or ink grounds from etching plates, brushes or surfaces. It is easy to use and can be washed off the plate with water, however, if allowed to dry in the plate, it hardens and can be very tough to remove without damaging the plate. RemovALL contains no toxic substances, is not flammable, not harmful to touch, does not release toxic fumes, and is biodegradable (Kansai Plascon, 2013). RemovALL is a viable substitute to the Chrisal Economic cleaner used at the Academy in Ghent.

Chrisal products are distributed by Hychem in South Africa. Hychem sells a number of cleaning products including a probiotic range. Their Super CMF 240 product is the South African branding for the Chrisal Economic that is used at the Academy in Ghent. This product is highly effective at removing any acrylic or grease-based substances and is widely accessible through Hychem distributors located around South Africa. Hychem can be contacted via their website www.hychem.co.za.

5.3.3 Rosin Aquatint

The flammability risk in the CVA is compounded with the use of Rosin Aquatint. Rosin powder is used at the CVA in the traditional method for aquatint tones. The powdered rosin is kept in a cupboard with a hand cranked fan for agitating the small particles which settle on the plates. Rosin dust particles suspended in air in the presence of an ignition source can cause a dust explosion (Howard 1998). The rosin cupboard in the CVA is situated directly next to a gas bottle and burner for melting the rosin onto the plates. Students are provided with masks for working with the rosin dust application process. This process is incompatible with an extraction system as the movement of the air would disturb the dust particles on the plate and create uneven tones when etched. When rosin is heated to high temperatures, it

undergoes a process of thermal decomposition during which the chemicals break down and turn into a series of hazardous gasses.

Figure 5.3 Gas bottle and burner next to rosin cupboard at the CVA, photographed by Eloff Pretorius (2018)

The open flame burner is kept next to the rosin cupboard (Figure 5.3) so that the plates are not agitated by the air while they are moved to the burner. This means that an open flame is always near the rosin cupboard when it is in use. This is an unsafe set of apparatus and processes to have in such close proximity even though they are very rarely used. After the aquatint plates have been etched, the rosin is removed with lacquer thinner. Lacquer thinner If inhaled excessively it can cause fatal chemical pneumonitis. Ingested lacquer thinner attacks the central nervous system and can cause death. Thinners and other petroleum-based mineral spirits must be stored in closed containers but can build up pressure if exposed to heat. Mineral spirits react strongly with oxidising agents such as nitric acid (Powafix 2014).

5.3.4 Airbrush Aquatint

The acrylic airbrush medium used at the Academy in Ghent can be adapted for the CVA by replacing the Future Floor Polish with Pledge 3in1 HighShine floor polish[3]. The other

[3] Pledge 3in1 HighShine is the South African equivalent to Future Floor Polish.

ingredients are available at some art supply stores like The Deckle Edge in Cape Town. This aquatint medium was used to create a series of aquatint prints like Figure 6.11 discussed in Chapter 6. More research in this area may find better acrylic airbrush medium options for the CVA context.

Airbrush Aquatint recipe for the CVA

- 80 ml Pledge 3in1 HighShine floor polish
- 12 ml Golden GAC-100
- 32 ml India ink
- 1/4 ml Winsor & Newton Flow Improver
- 1/4 ml Golden Airbrush Medium

The hazard of acrylic particles released in the air with this technique is minimal compared to the variety of dangerous factors that are introduced with rosin aquatint. Unlike rosin aquatint, the acrylic particles do not need to be melted onto the plate. Rather, they adhere to the plate on contact, removing the need for open flames in the studio. The CVA has already purchased the infrastructure required for airbrush aquatint, including the pump, airbrush and extraction unit seen in Figure 5.4. The continued use of this system will allow printmakers to work with non-toxic aquatint in the CVA.

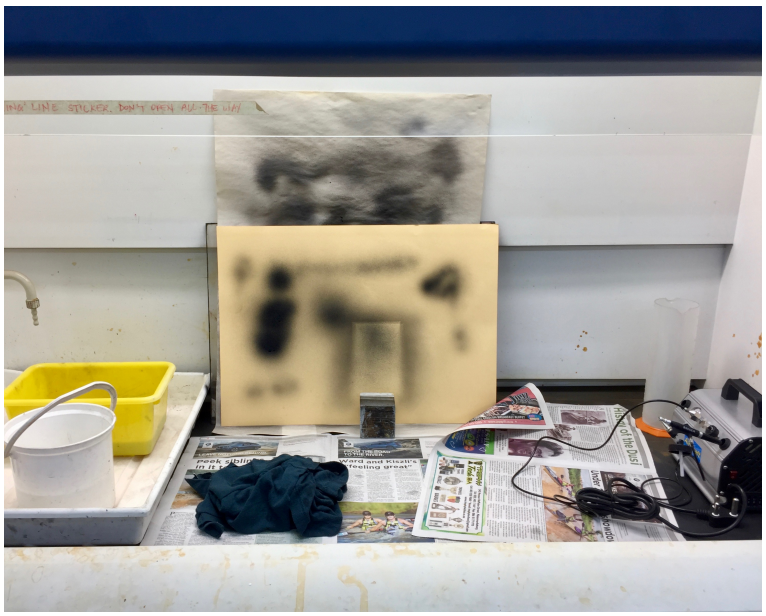

Figure 5.4 Acrylic airbrush aquatint at the CVA, photographed by Eloff Pretorius (2018)

5.3.5 Acid-based etchants

Etching activities at the CVA are conducted by second-year and postgraduate students primarily. The introductory etching course with second-year students teaches etching with nitric acid. Nitric acid is a very dangerous substance that may explode in the presence of reducing materials, organic materials, metals, or alkalis. It reacts violently with alcohol, turpentine, and charcoal (Protea Chemicals 2017). Students etch wearing gloves and goggles and use the lab fume cupboard to avoid contact with the nitric acid or dutch mordant. Careful working and close supervision has prevented accidents involving acid from occurring in recent years. Unfortunately, nitric acid has been disposed of at the CVA by diluting it with water and rinsing it down the drain. This practice damages studio infrastructure as the drainage system is metal and other substances like organic materials, alkaline soaps and even turpentine are washed down the same drain.

Etching with dutch mordant was stopped after the 2016 workshop with Everaert introduced ferric chloride etchant. However, the studio still contains substantial quantities of hydrochloric acid and potassium chlorate used to mix dutch mordant. The storage of these excess chemicals is a significant hazard in the studio as they are highly reactive and must be stored correctly according to their MSDS files. Hydrochloric acid reacts with most metals to produce flammable hydrogen gas. Hydrochloric acid is highly reactive with organic materials and oxidisers (like nitric acid or peroxide) and can explode if water is added to it (Protea Chemicals 2017). Potassium chlorate is one of the most dangerous oxidising agents, hence its use in manufacturing explosives (Letts 1990). It is extremely reactive in the presence of reducing agents[4]. Potassium chlorate is toxic to blood and most major organs in the body, including the kidneys, lungs, nervous system and liver (Science Lab.com Inc 2013). The properties of these materials, as well as the properties of the materials used in non-toxic processes summarised in Figure 5.7 and Figure 5.8.

The lab fume cupboard in the CVA is used for etching and prevents hazardous gases generated in the etching process from escaping and affecting printmakers. This cabinet is essential for safe etching with nitric acid and dutch mordant, as these reactions produce nitric oxide and hydrogen gas respectively. The cabinet is also essential for safely dissolving solid ferric chloride and mixing dutch mordant, both of which produce chlorine gas. At the time of writing this paper, the cabinet had a severe leak in its drainage system, meaning that if a mordant were spilt inside the cabinet, it would likely leak out onto the studio floor and onto the acid storage units underneath. Fixing this leak would improve the studio's ability to safely handle these acids.

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[4] Common reducing agents found in the etching studio include ammonia, metals, and hydrogen gas, which is a byproduct of etching with hydrochloric acid.

The acid storage cabinet beneath the fume cabinet contains a number of corrosive substances, some of which have been in storage for several years and are not clearly labeled. The cabinet itself shows signs of oxidation, likely caused by the slow release of chemicals inside (Figure 5.5). There are several oxidisers and acids which should not be stored close together, as they may react with one another and cause the slow degradation of the container over time. Due to changes in printmaking staff over the years, several different mordants have been used and stored in small quantities in the same cabinet rather than being disposed of properly. The presence of these unmonitored, unlabelled chemicals under a leaking fume cabinet, next to the rosin cupboard and gas bottle, is a severe risk.

Figure 5.5 Acid storage cabinet showing signs of oxidation, photographed by Eloff Pretorius (2018)

5.3.6 Metal salt etchant

A solution for the numerous hazards listed above may be for the CVA to switch to copper etching exclusively. Using a metal salt etchant like ferric chloride or the Edinburgh Etch as the only mordant at the CVA would greatly reduce the risk of a chemical accident. There would be far fewer chemicals present in the studio and these are not as volatile as traditional chemicals. There would be no need to etch in a fume cabinet, as no harmful gases would be released by the etching reaction, however Ferric chloride in solid form must be dissolved in water before use. This process releases chlorine gas which is an extremely dangerous gas. If ferric chloride cannot be purchased in liquid form, it is essential that it is dissolved in a lab

fume cupboard and that appropriate precautions are taken by the persons involved. Ferric chloride's distinct yellow colour makes it easy to spot and recognise as dangerous, reducing the chances of the mordant being mistaken for water or for spills to go unnoticed.

Edinburgh Etch Recipe for Copper

- 6 litres of 42 Baumé ferric chloride
- 1.2 litres of water
- 400g of citric acid powder.

While the Edinburgh Etch is still a dangerous chemical mixture to work with, it is much less reactive than other acids. The addition of citric acid lowers the pH of the solution, preventing the diluted copper particles from forming an insoluble salt known to accumulate on the surface of the copper and slow down the reaction (Kiekeben 2003). The Edinburgh Etch can be further improved by creating a vertical etching tank with a small pump to help agitate the solution (Howard 1998). *Non-Toxic Intaglio Printmaking* (1998), which is available in the UKZN library, includes a detailed guide on how to set up such a tank. The Edinburgh Etch can be used to etch different metals including copper, zinc and steel, although Kiekeben recommends altering the proportions of the ingredients slightly for the different metals[5] in his chapter of *Non-Toxic Intaglio Printmaking* (1998). Aluminium should never be etched with ferric chloride as the reaction can release heat, flammable hydrogen gases and acidic gases (Kiekeben 2003). Some printmakers prefer to use the Saline Sulphate Etch for zinc and aluminium. This copper sulphate and salt solution etches faster that ferric chloride and when used to etching aluminium, creates a textured open bite effect similar to an aquatint.

Saline Sulphate Etchant for Aluminium and Zinc

- 140 grams copper sulphate crystals
- 140 grams of table salt
- 2 litres of water

There should be an allocated storage area for old etchant that is clearly labelled with MSDS files as seen in Figure 5.6. The containers should be stored away from metal objects and there should also be a form of secondary containment so that if one of the containers fails, the spill will be contained in the allocated area and can be cleaned up quickly and easily.

[5] Different metals can not be etched in the same bath. This causes the dissolved metal particles from the first plate to bond to the surface of the second metal plate when it is submerged in the mordant.

Gloves, eye protection, closed shoes, and an apron should be worn whenever working with the etchants.

Figure 5.6 Old ferric chloride in marked containers within a secondary container at the Academy for Visual Arts in Ghent, photographed by Eloff Pretorius (2018)

5.3.7 Hard ground

Traditional hard grounds have been used at the CVA. These grounds are melted and rolled onto the plate in a process that deposits a thin waxy layer. This heating processes can cause thermal decomposition of the bitumen and rosin in the ground and the ground is removed using turpentine. Alternative acrylic grounds that are accessible to printmakers in South Africa include Pledge 3in1 HighShine floor polish and Lascaux hard ground. These can be mixed with a drawing ink to give a dark finish and are applied by brushing a thin layer onto the plate, or poured onto the plate surface to provide an even coating as described in Howard (1998). Instead of using bitumen or shellac for stopping out, DALA Acrylic Medium and Pledge 3in1 HighShine floor polish both work well.

Ink-based grounds such as include Graphic Chemical & Ink 1461 Block Crimson Red and Baldwin's Intaglio Ground (BIG) can be imported from the manufacturers. Graphic Chemical & Ink 1461 Block Crimson Red can be applied with a hard roller in a thin, even layer. It should then be heated on a 30-50°C hotplate until it hardens. If it becomes brittle, it has been overheated and should be removed and reapplied. A brittle ground will result in uneven mark making with jagged edges. The ground should not be etched for longer that 40

minutes in an Edinburgh Etch mordant for copper. After 40-50 minutes the ground begins to break down and create a grey aquatint-like tone. This is the primary disadvantage of using this ground. The water solubility of the ink makes cleaning the inking surface and rollers very quick and easy. BIG can be applied as described in Chapter 4. The DALA, Lascaux and BIG grounds can be removed using Plascon RemovALL, while the Graphic Chemical & Ink 1461 Block Crimson Red can also be removed with a strong solution of soda ash.

Acrylic grounds also expand the aesthetic possibilities of etching. Diluting an acrylic ground and painting this solution onto the metal plate creates a wash-like effect. The more diluted the solution, the darker it will etch. The diluted solution results in polymer particles that are spread out, and as the plate etches, these particles are gradually removed by the chemical action of the mordant. “The result is tonal variation which does not have a perceivable aquatint dot structure” (Howard 1998). This gives the printmaker the ability to work with brushstrokes to create a painterly aesthetic.

5.3.8 Degreasing

Since 2016 degreasing at the CVA has been done using soy sauce instead of ammonia and talc powder. The salt content of the soy sauce dissolves and removes grease and oil on the plate very effectively. This material is safe to use and cheap and should continue to be the primary degreasing method at the CVA.

5.3.9 Soft ground

Marnix Everaert’s soy wax soft ground uses a combination of stiff lithographic ink and soy wax. This soft ground is very effective and should be can be mixed and applied as described in Chapter 4.

5.3.10 Relief printing

Relief printmaking can also be transitioned to non-toxic practice by cleaning the rollers, surfaces, and linoleum plates with oil instead of solvents. Woodblocks may still require some solvents to clean, but other aspects of the cleaning processes can be changed to vegetable oil cleaning. This process is easy, effective, cheap, and would dramatically reduce the amount of solvents used at the CVA, especially considering that the current curriculum teaches relief printmaking to first-year classes which are often the largest classes. Starting the first-year printmaking program with a solvent-free printmaking course could establish a familiarity with non-toxic practice that would benefit the students throughout the duration of their studies and careers.

5.3.11 Photopolymer Intaglio-Type

Through my practice, photopolymer intaglio-type was successfully tested at the CVA[6] using the methods observed at the Academy in Ghent. This technique could be introduced at the CVA as part of the third-year silkscreen module. The screenprint and dark room infrastructure provide all the essential elements for photopolymer intaglio. This technique expands the application of intaglio practice at the CVA and creates an opportunity for students with training in digital arts to incorporate digital or digitally-generated images into their intaglio printmaking practice. Non-etch intaglio type allows artists to print images without using a mordant, making it one of the safest intaglio techniques available to artists. It could become a valuable aspect of the CVA printmaking program.

5.3.12 Water-based inks

The Caligo line of oil-based, water-soluble printmaking products are high quality and very easy to clean. They are easily accessible in South Africa and deliver extremely good tonal quality but are more expensive than normal oil-based etching ink and drying times are much longer. These inks were used to produce the prints seen in Figure 6.11 - 6.14. These inks work exceptionally well on aquatints.

5.3.13 Studio safety

Accidents can be prevented through clearly labelled and colour-coded areas as well as visible instructions at each work station that remind students of the correct procedures. An orientation program that teaches new students how to use the studio and how to act in the case of an emergency is essential. Many students may not have the time to understand the chemistry of etching processes, but they can be taught practical safety steps like how to flush an eye that has come into contact with a hazardous substance, how to neutralise an acid spill with an alkaline substance, and to scream loudly if there is an emergency so as to immediately get the attention of the staff and fellow students.

5.3.14 Summary of findings

The CVA has well-equipped infrastructure for working with traditional etching materials and processes. However, due to the hazardous nature of traditional etching materials and the large variety of chemicals used in traditional etching processes, the studio contains many health hazards. Although there have been no recent incidents where a student or staff

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[6] See *Acid Mine Drainage* (2018) series in Appendix B.

member was injured or any accidents resulting in damaged infrastructure, the presence of these harmful chemicals in an art studio should be avoided. As Monona Rossol points out, art students often have sub-parr training and orientation with regards to hazardous chemicals (Howard, 1998). This lack of knowledge concerning hazardous chemicals can lead to an attitude that risk-taking is an exciting part of the artistic processes. Within the context of an academic institution such as the CVA, the materials and processes used are chosen by the lecturer. Steps should be taken to minimise the hazards that students are exposed to. "Art teachers are responsible not only for their own health, but also for safeguarding the health of their students" (McCann, 1992 p.140).

5.4 Reference tables

The following figures were created to summarise the data gathered and discussed in this chapter. Figures 5.7 and 5.8 were compiled using the MSDS information and summarise this information to provide a quick-reference system to guide the use and storage of chemicals in both traditional and non-toxic intaglio practice.

Mordant	Components	Applications	NFPA 704 Diamond*			UN GHS Criteria	
			Health	Flamibility	Instability	Hazard Indicator	Pictogram
Dutch Mordant	Hydrochloric Acid	Copper Etching	3	0	1	GHS05: Corrosive	
						GHS07: Harmful	
	Potassium Chlorate		3	0	0	GHS03: Oxidizing	
						GHS01: Explosive	
Nitric Acid	Nitric Acid	Zinc Etching	3	0	0	GHS03: Oxidizing	
						GHS05: Corrosive	
Edinburg Etch	Ferric Chloride	Copper Etching	3	0	2	GHS05: Corrosive	
	Citric Acid		2	1	0	GHS07: Harmful	

(INCHEM, 2018)

* Note NFPA scale values: 4 - Severe Hazard; 3 - Serious Hazard; 2 - Moderate Hazard; 1 - Slight Hazard; 0 - Minimal Hazard

Figure 5.7 Hazard classifications for mordants, adapted from INCHEM by Eloff Pretorius (2018)

Figure 5.7 compares the hazard classifications of three mordants most commonly used for etching at the CVA. This table compares the National Fire Protection Association's system for hazard identification. Materials are given a rating between 0 and 4 in three categories:

health, fire and instability, where 0 indicates minimal hazard and 4 indicates severe hazard. Figure 5.7 shows that the traditional etchants, nitric acid and dutch mordant, have similar health ratings to the Edinburgh Etch. All of these chemicals are serious health hazards if used improperly.

In the far-right column of Figure 5.7, the United Nations Globally Harmonised System of Classification and Labelling of Chemicals (UN GHS) indicates that the three mordants have different physical hazards. Dutch mordant contains corrosive, harmful, oxidising, and explosive chemicals; nitric acid is both an oxidiser and corrosive; while Edinburgh Etch is labelled corrosive and harmful. Here, the advantage of using Edinburg etch becomes apparent as to does not contain oxidising or explosive chemicals. Knowing these characteristics of the materials is important for safe handling and storage.

Figure 5.8 indicates the storage and compatibility of combinations of hazardous chemicals used in intaglio printmaking. The top row lists various material classifications, which are colour-coded. The left hand column lists hazardous chemicals used in intaglio printmaking. A coloured cell indicates that the material listed on the left belongs to the corresponding classification in the top row. An (X) indicates that the material on the left is incompatible for storage or use with the group on the top. For example, turpentine is coloured green, indicating that it is an organic material, and yellow, indicating that it is combustable. It is marked (X) in the acids and oxidisers columns, indicating that it is incompatible for use or storage with any acids or oxidisers.

	Acids	Oxidizing agents	Organic materials	Cobustable materials	Alkalis	Bases	Reducing agents	Metals
Ammonia	X				X			
Acetic acid	X	X			X		X	X
Citric Acid		X			X	X	X	X
Ferric Choride						X		X
Hydrchloric Acid		X	X		X	X		X
Nitric Acid	X		X	X	X	X	X	X
Potassium Chlorate	X		X	X			X	
Lacquer Thinners	X	X						
Turpentine	X	X						

Figure 5.8 Storage compatibility table, adapted from INCHEM by Eloff Pretorius (2018)

Figure 5.9 is a comparative summary of the materials and equipment required for traditional and non-toxic printmaking. This list can be used as a checklist to make sure that all the correct materials are available before beginning a project with either method. It also functions as a comparison between the types of materials used in the two methods. The non-toxic method requires a larger variety of materials but very few of these are hazardous or incompatible for storage or use in close proximity. The traditional method uses a smaller variety of materials but they are more hazardous and many of these cannot be used or stored in close proximity to one another.

	Traditional Materials	Nontoxic Materials	Photopolymer
Mordants / Developer	Hydrchloric Acid	Ferric Chloride	Soda Ash
	Potassium Chlorate	Citric Acid	
	Nitric Acid		
Grounds	Beeswax Hard Ground	Acrylic Hard Ground	Photopolymer Film
	Bitumen	Ink Ground	
Soft Ground	Beeswax & Animal Fat Soft Ground	Soy Wax	
		Lithography ink	
Cleaning Materials	Lacquer Thinners	Vegetable Oil	
	Turpentine	Vegetable Cleaning Agent	
	Ammonia	Soy Sauce	Soy Sauce
	Talc Powder	Powdered Chalk	
	Dish Soap	Dish Soap	
		Plascon RemovALL	
		Soda Ash	Soda Ash
Aquatint	Rosin Dust	Acrylic Medium	Acrylic Medium
		India ink	India ink
		Flow Improver	Flow Improver
Infrastructure	Solvent Extraction Units	Aquatint Extraction booth	Dark Room
	Etching Fume Cabinet	Airbrush and compressor	UV Exposure Light
	Gas bottle and burner	Hairdryer	Vacuum Bed
	Hotplate	Hotplate	Adobe Photoshop CS
	Rosin Cupbord	Ferric Chloride Rinsing Station	

Figure 5.9 Material and infrastructure check list, compiled by Eloff Pretorius (2018)

5.5 Conclusion

Figure 5.9 lists the infrastructure required for a studio to operate either traditional or non-toxic intaglio printmaking methods. The CVA has the essential infrastructure for both traditional and non-toxic methods to be practiced in the studio. Switching to non-toxic printmaking methods would not require further infrastructure investments and would improve the safety of the studio for practicing printmakers. My recommendation is that the non-toxic methods detailed in this study should be implemented at the CVA for undergraduate printmaking courses. This would improve safety in the studio and allow students to work in new mediums like photopolymer intaglio type.

CHAPTER 6: DISRUPTION

6. A discussion of my printed works

The research performed in this study generated a series of printed works, which illustrated the visual characteristics of the non-toxic materials and processes that were tested. These prints are part of the findings of this research. The following chapter is a discussion of the materials and processes used to generate these images, as well as the subject matter depicted in these works. This choice of subject matter evolved in response to an increased awareness of the nature of hazardous chemical waste; the mining industry as a force that contributes to environmental degradation; the problem of toxic landscapes in the South African context; and a general systems understanding of the earth. The works produced in this research were exhibited at the *Disruption* exhibition at the Jack Heath Gallery. Appendix B is a catalogue of the exhibition.

6.1 Initial tests

Through my artistic practice, I created a body of printed works that illustrate the visual characteristics of non-toxic etching processes and demonstrates their similarity to traditional etching aesthetics. I also tested new processes that could expand the visual vocabulary of etching and intaglio at the CVA through the incorporation of new materials and processes, including digital imagery. The centrality of hazardous chemicals in this research and the effort to avoid toxic materials required a systematic analysis of the working space and all the materials present, their relationships to each other, and their potential hazards to people in the working space. This systematic analysis of the studio, materials, and processes, was carried over into the printmaking practice. Each new material and process was tested repeatedly until it yielded consistent results that could be replicated in the future.

Before the case study in Belgium began, I tested alternative materials like acrylics and alternative etchants based on information found in the literature and experience from the 2016 workshop with Everaert at the Caversham Press. Initial tests aimed at finding an acrylic medium that could be used as a hard ground. These tests focused on the quality and consistency of fine line work drawn through an acrylic ground, its strength to resist the action of the mordant, and the ease with which the ground could be removed after etching. Figure 6.1, titled ‘Eucalyptus Globulus’ (2017), depicts a series of large dead trees viewed from below. This print showed the initial success of the acrylic ground to protect the plate surface during long etching times. However, many of the drawn lines had a jagged edge quality resulting from the DALA Acrylic Matt Glaze Medium’s rubbery consistency which

was prone to tearing when the etching needle moved through the ground in the drawing processes.

Figure 6.1 Eloff Pretorius, *Eucalyptus Globulus* (2017)
Acrylic resist etching, photographed by Eloff Pretorius (2018)

I then tried to work with diluted Lascaux and DALA acrylics in the hope that a thinner layer of acrylic would harden without the rubbery consistency and deliver better results. Acrylic grounds work by a process called polymerisation, where the tiny monomer molecules floating in a watery solution join together to form long chains as the water evaporates (www.nontoxicprint.com). These long chains give acrylic grounds their strength as they form a tough, plastic layer on the metal plate. In some test pieces, the diluted acrylic ground began to break down during etching. This resulted in interesting tones which could be achieved by applying different dilutions of acrylic to the plate and etching the plates in Edinburgh Etchant for periods upwards of forty minutes. This technique etched inconsistent aquatint-like tones on the plate and created a visual effect similar to Keith Howard's 'destruction ground' technique (Howard 1998). This aesthetic effect was new, unpredictable, and appealing.

The application of different dilutions of DALA acrylic with a paint brush can be seen in Figure 6.2. The darker areas show a thick application of acrylic on the copper plate, while

the lighter coppery areas show the use of diluted acrylic. This technique was used to create the print ‘Rooidam’, seen in Figure 6.3. Increasing the water content caused the acrylic particles to spread out so that when they dried and formed polymer chains, these chains were spread out with gaps in between where the mordant could etch into the copper. The more I diluted the acrylic medium, the darker it etched, until it reached a point where the acrylic particles were too sparse to resist the etchant and no texture was created by the etching processes. Without texture, the copper could not hold ink and would print white.’Rooidam’ illustrates the variety of tones and textures created with this technique. The white mass in the centre of the print had the thickest application of acrylic and so the mordant could not etch into the copper. In the other parts of the print, there is a full range of tones from light grey to heavy black.

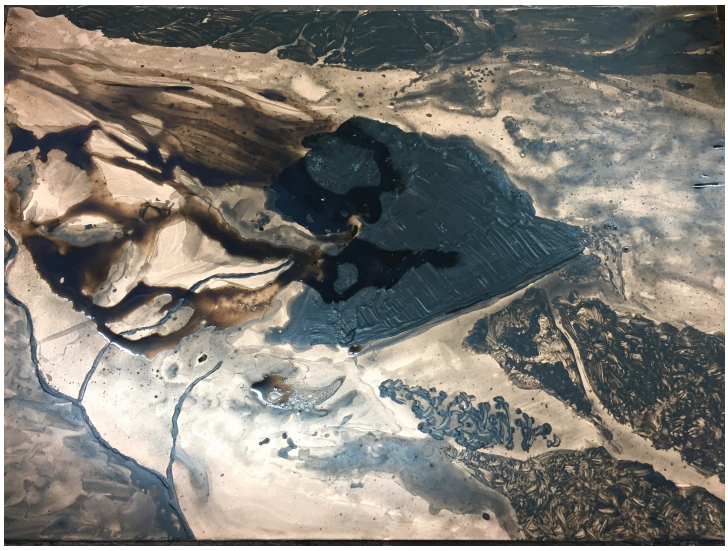

Figure 6.2 *Rooidam* copper plate with DALA acrylic before etching, photographed by Eloff Pretorius (2018)

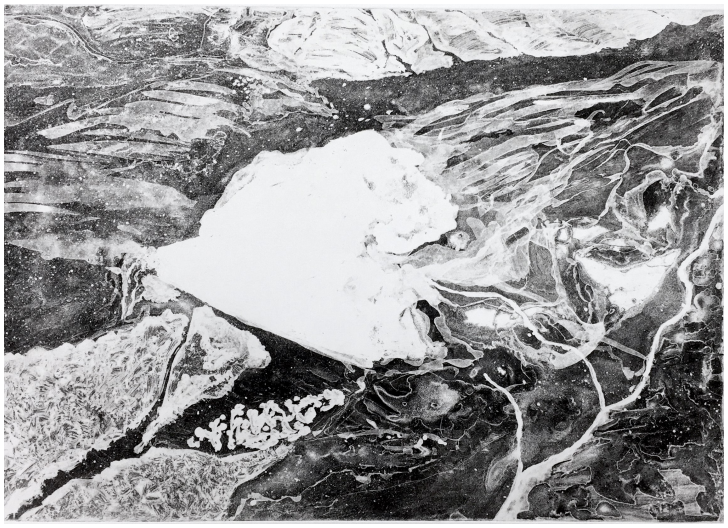

Figure 6.3 Eloff Pretorius, *Rooidam* (2017) Acrylic resist etching, photographed by Eloff Pretorius (2018)

After establishing an understanding of this process, I created a series of thirteen small plates using both diluted acrylics and acrylic hard ground. These plates were printed together in the print titled 'Environmental Aesthetics' (2017), and one of the sections is seen in Figure 6.4. The varied tones of the 'destruction ground' style process guided the addition of the contour-like hard ground lines added in a second round of etching. These plates showed landscape-inspired forms influenced by cartographic images. The use of contour lines introduced a bird's-eye perspective that created map-like spaces in the small plates. These cartographic areas were interrupted by the textures of the diluted acrylic and areas of dense hatched lines, together creating a sense of disruption and fragmentation of space. This use of perspective and texture guided my interest to create prints that combined multiple perspectives.

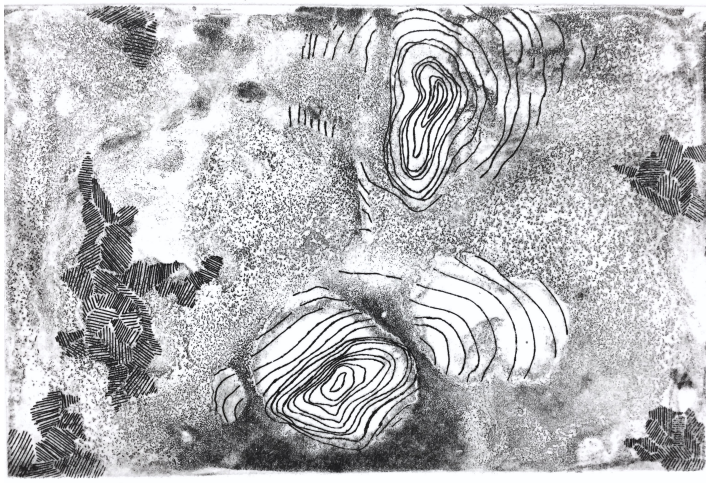

Figure 6.4 Eloff Pretorius, *Environmental Aesthetics* (2017) detail, photographed by Eloff Pretorius (2018)

In my initial test pieces at the Academy for Visual Arts in Ghent, I created detailed landscapes to test materials such as Baldwins Intaglio Ground, airbrush aquatint, and soft ground. Unlike the 'Environmental Aesthetics' (2017) print, these prints were controlled and meticulous, using familiar subject matter so that the new materials could be evaluated and compared to traditional examples of etching. Figure 6.5 and Figure 6.6 show the use of fine line to create textured landscapes with fine grasses and trees. The line work showed the quality of ferric chloride as a mordant, producing clean, sharp lines. Densely hatched areas showed the strength of the BIG ground and its ability to hold together in the drawing and etching stages.

The varied aquatint tones are used to create a sense of atmospheric perspective and depth in the landscape. With the airbrush aquatint, I was able to create fine coatings where the individual dots of the application were invisible to the naked eye as well as applications where the dots created a rough, granular texture. The airbrush's adjustable nozzle gives the printmaker a lot of control and variation in density and size of the acrylic particles, even allowing for different density and particle sizes in the same round of spray application. Gradients between aquatints of varying tonality can be created using very fine 2000 and 2500 grit sanding paper as seen in the bottom half of Figure 6.5.

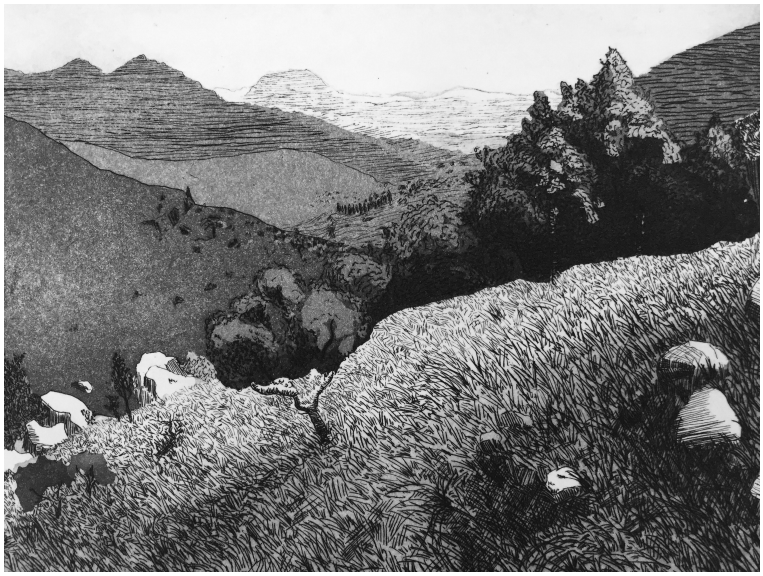

Figure 6.5 Eloff Pretorius, *Untitled I* (2018) Etching and aquatint, photographed by Eloff Pretorius (2018)

Figure 6.6 Eloff Pretorius, *Untitled II* (2018) Etching and aquatint, photographed by Eloff Pretorius (2018)

6.2 Toxic landscapes

Following my experience working at the Academy in Belgium, I returned to the CVA and began using the processes I had learnt in Ghent at the CVA. At this time, the subject matter in my work came into focus. Now that an understanding of the medium was established, I looked intently at the themes of my research and the subjects which I felt could be a visual expression of these themes. My interest was drawn to mined landscapes as toxic spaces in South Africa, spaces where human activity had scarred the land physically and chemically in ways that created striking visual disruptions.

I began visiting mined landscapes to photograph the intimate details of their existence. Through my own active process of visiting mine dumps, climbing the layers of sand, and photographing the otherworldly textures and surreal colours of these sites, I compiled a photographic record. I documented the strangely-coloured water flowing off the dumps, full of red and turquoise material, that create metallic crusts at the water's edges. These strange and unnatural colours indicated the presence of chemical waste referred to as acid mine drainage. Acid mine drainage is formed when iron pyrite from the mined rocks is exposed to oxygen and water. The resulting reaction releases sulphates and turns the runoff from these sites into sulphuric acid (Bobbins, 2015 p. 1). The resulting sulphuric acid, which is

hazardous to humans and to the environment, is then carried across the landscape along hydrological networks into rivers and wetlands, saturating the topsoil, affecting crops, biodiversity and the potable water supply in the region (Bobbins, 2018 p. 64). If the mines can be compared to scars on the landscape, then the acid mine drainage can be thought of as the incessant bleeding of these scars.

Figure 6.7 Chemical runoff at the Mooifontein mine dump, photographed by Eloff Pretorius (2018)

Each of these mines have an effect on their immediate environments, transforming the ecology, populations, and landscape (Bobbins, 2015 p. 12), but they are also individual components of the large system that is driving environmental degradation. The global force of the mining industry is “exhausting the fossil fuels that were generated over several hundred million years, resulting in large emissions of air pollutants…” (Crutzen, 2006 p. 14). These pollutants saturate the biosphere, acidify large bodies of water, damage populations of sensitive animal species, and accumulate in the atmosphere.

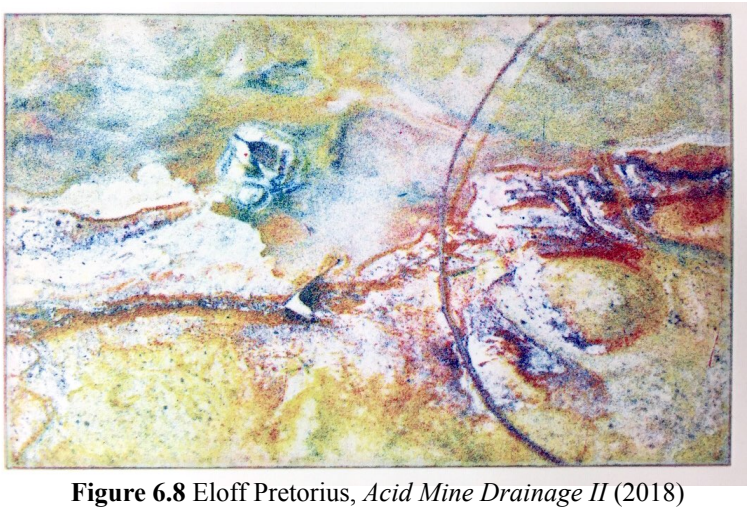

Figure 6.8 Eloff Pretorius, *Acid Mine Drainage II* (2018)
Photopolymer Intaglio-type, photographed by Eloff Pretorius
(2018)

Acid mine drainage is the subject of three prints based on photographs taken in the Mooifontein area in Johannesburg. The photographs captured the unusual colours of a stream containing chemical runoff at the base of a mine dump (Figure 6.7). The CMYK intaglio-type photopolymer printmaking technique allowed me to print these photographs manually in full colour using the technique described in Chapter 4.2. Figure 6.8. and Figure 6.9 show the colours and photographic nature of this technique. Both of these images were created at the CVA using the existing screenprinting UV exposure infrastructure. The CMYK intaglio-type process is a non-etch process, meaning that these images could be created without etching the copper plate. I was able to use the same four copper plates to edition seven separate images without permanently scarring any of the plates. These intaglio prints depicting the presence of acid mine drainage in a running stream were produced without using a corrosive mordant.

Three colour prints showing satellite views of the South African landscape in areas where human activity is clearly visible as having shaped and changed the landscape through mining and agriculture were produced at the Academy in Ghent during my testing of the photopolymer process. These three images were exhibited alongside the ‘Acid Mine Drainage’ prints to compare photopolymer prints created at the Academy in Ghent with photopolymer prints created at the CVA. The juxtaposition of these micro and macro subjects printed in the same format is an expression of the ‘parts that make up the whole’ and draws attention to the relationship between chemical pollution spread through waterways and the large farming landscapes around rivers in South Africa.

Figure 6.9 Eloff Pretorius, *Acid Mine Drainage III* (2018)
Photopolymer intaglio-type, photographed by Eloff Pretorius (2018)

6.3 Overview Perspective

Systems theory influenced the subject matter of my etchings and lead to the use of two overlapping perspectives in the landscape prints. Landscapes seen in first person perspective were juxtaposed with the abstracted forms of landscapes seen from an overview perspective. The overview perspective, accessed through satellite images of the earth, allowed me to see the earth as a whole and identify parts that indicated destructive human activity. The overview perspective changes the way we see the individual parts of the landscape: rather than appearing insignificant and isolated, they make up a vast pattern of destructive mining practices around South Africa.

In these regions many mines can be spotted from satellite and high-altitude photographs. The large dumps, open pits, and industrial infrastructure stand out as scars on the surface. In places like Charletonville, Gauteng, the natural landscape is interrupted suddenly and brutally by sharp geometric forms (Figure 6.10). These forms appear superimposed onto backdrops of sprawling vegetation, rural communities, and urban grids. They create points of high contrast across the country, each mine a unique shape decorated with colourful chemicals and fine lines indicating the erosion of toxic sand and radioactive dust (Bobbins, 2015 p. 13). Seen from above, these shapes form a scattered mosaic of fragmented land, but in person they are gigantic structures comprised of rock that was blasted, unearthed, crushed to a fine powder, and stacked meticulously to create vast pyramid-like monuments.

Figure 6.10 Mine waste near Carletonville, image from Google (2017)

The mines became a focal point for my work, which tied my concern about toxic chemicals in the printmaking environment to a larger conversation about the impact of human activity on the South African landscape and collectively on the global environmental system. This choice of subject matter was also inspired by the photography of Edward Burtynsky who, following the *New Topographics* photography movement in the 1980s, centred mankind's impacts as his primary subject, rejecting the pristine landscapes offered by many landscape photographers prior ((Burtynsky and Ewing, 2016). "His work can be seen as part and parcel of a collective enterprise - namely a global photographic effort to gauge the state of the earth's 'skin', which turns out to be not as robust as we imagined" (Burtynsky and Ewing, 2016).

Using the vast collection of satellite imagery available online, I was able to study and incorporate an overview perspective into my depictions of the South African landscape. Showing landscapes from above depicts them as abstracted and unfamiliar. Removing the horizon line and seeing the landscape as a two dimensional image with no spacial depth or familiarity creates an ambiguous space where the viewer cannot orient themselves. The theme of working with multiple perspectives is also expressed by Everaert in response to question ten of the interview in Chapter 4. Here he states that a change of perspective is essential in order to move away from hazardous etching processes and adopt new non-toxic ones. "I think it is more the mindset… Have an open mind and be skeptical."

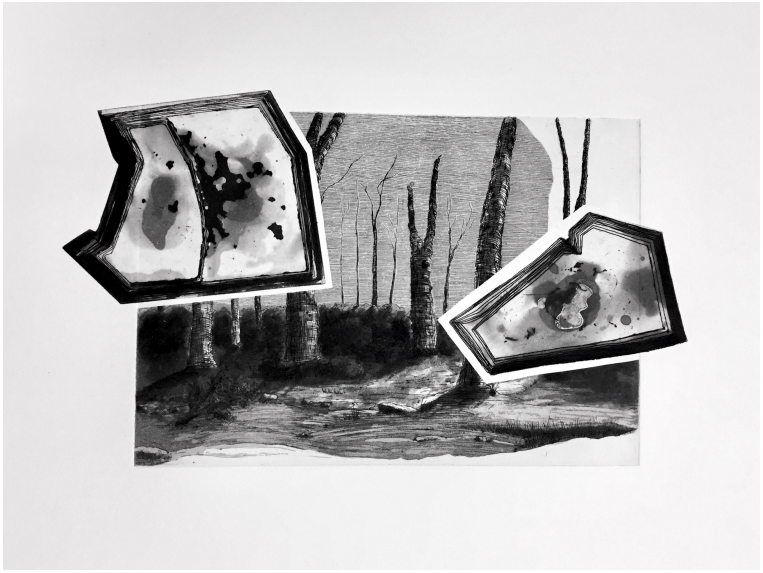

Figure 6.11 Eloff Pretorius, *Intrusion* (2018) Etching and Aquatint, photographed by Eloff Pretorius (2018)

Two of the mines seen in Figure 6.10 overlap a landscape to create a contradiction of perspectives in Figure 6.11. This effect was created by cutting the copper plates out into the forms of mine dumps and etching these plates with hard ground and aquatint. The landscape plates and shaped geometric plates were printed onto a single piece of paper as a visual illustration of the intrusions that these mines create in the landscape. The result is a contrasting image where the familiarity of a landscape etching is intruded upon by sharp unnatural forms.

These forms break out of the traditional rectangular format of a landscape etching. They disrupt the format and extend out into the surrounding page. These intrusions overlap the boundary of the normal landscape format, existing within the landscape and outside of it. So also the non-toxic printmaking methods used to create this body of printed works exists within the aesthetic tradition but outside of the traditional method. Thematically, this disruption echoes the nature of my research, which seeks to change a traditional approach to etching by introducing new technologies to an old art form.

The prints in Figure 6.12 and Figure 6.13 were created using Graphic Chemical & Ink 1461 Block Crimson Red as a hard ground. This ink is oil-based but water-soluble, and when heated creates a hard, wax-like coating on the plate. It is very easy to clean up, as you can use a wet cloth to wipe the ink away and after heating and hardening the ink, it can be removed using a soda ash solution.

Figure 6.12 Eloff Pretorius, *Disruption* (2018) Etching and aquatint, photographed by Eloff Pretorius (2018)

These two prints are based on photos that I took on a large mine dump in Mooifontein. The images show the slow return of vegetation to the fine sand that has been stacked to create a large pyramid-like mass. Both prints focus in on instances of erosion on the large mine dump. Erosion, caused by wind and rain, removes large quantities of the fine sand and distributes it across the surrounding areas. In these images the erosion is depicted with fine rhythmic line which evokes the fragility of these gigantic masses. The perspective used for these drawings is the perspective of a person walking across the mine dump. From this close view, the receding stacked layers are hidden from view behind one another. The inclusion of the geometric mine forms act as a reminder of the size and impact of these spaces. Although they look normal close up, they are disruptions in the landscape. The geometric forms depict the mine dumps as ‘wholes’ and the layering of the images over one another echoes the layering of waste layer upon layer until a vast monument is created.

In Figure 6.12 the aquatint is only used on the geometric mine shape in the bottom left corner of the image. The fine application of aquatint creates smooth, smoke-like tonal transitions. The landscape drawing is comprised only of hard ground lines etched at varying intervals to create tonal variation and a sense of depth as the landscape recedes into the hazy distance. The use of aquatint on the landscape in Figure 6.13 is very different. The acrylic particles sprayed onto this plate are large and globular. This effect was achieved using the adjustable nozzle of the airbrush system. The aquatint in this print creates a sandy texture that renders the sky dark and ominous, filled with sandy particles as if a large storm were moving through and had swept up the mine waste in its wind. Running diagonally down the middle of the image is an old, disused pipe from the dump’s formation. It has been

uncovered by the erosion and reveals the industrial nature of the mine dump's origin. The two geometric intrusions in this print are dark with very fine aquatint that alludes to the great vertical distance from where these have been observed by orbital cameras.

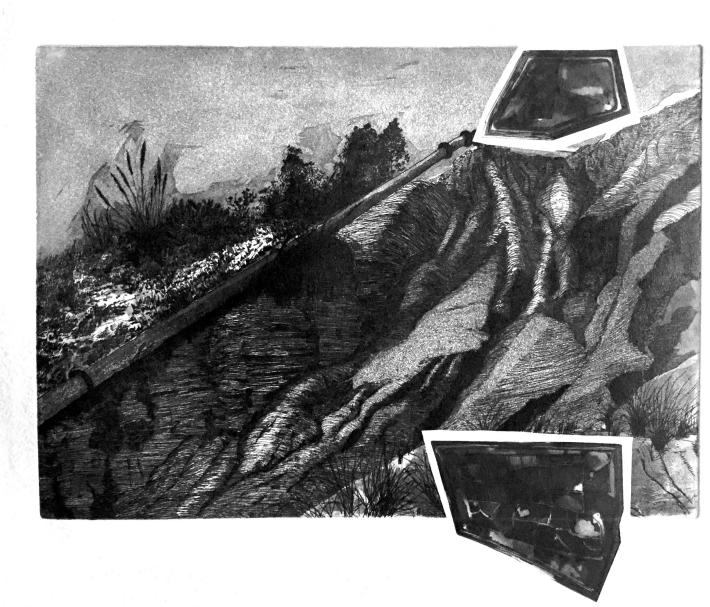

Figure 6.13 Eloff Pretorius, *Corrosion* (2018) Etching and aquatint, photographed by Eloff Pretorius (2018)

The work seen in Figure 6.14 is a culmination of the non-toxic processes studied during this research. To create this image, I used photopolymer, aquatint, hard ground, spit biting, and drypoint. The print was created at the CVA using accessible non-toxic materials and processes. The print illustrates how photopolymer can be used as an etching resist which allows the printmaker to etch photographic images onto the copper plate. Using Keith Howard's detailed instructions found in 'Non-Toxic Intaglio Printmaking' (1998), I applied a thin layer of photopolymer film to the copper plate. Once the film had been exposed, developed, and hardened, I applied an acrylic aquatint over the photopolymer to fill in areas where the film had been over-developed. The plate was etched using spit bite, which etched the photographic image onto the plate in a smokey mid-tone. A hard ground was then applied to the plate and a series of geometric forms evoking mine dumps were etched onto the plate. With a second application of aquatint and spit bite, the plate was given a dark tone with smoke-like quality. Finally, drypoint and burnishing were used to add final details. This print shows how digital imagery can be integrated into etching plates using photopolymer film alongside aquatint and ground-based processes.

The digital image used in this etching depicts a coal mine in the Somkhele area of northern KwaZulu-Natal. In this region, a local community is being gradually forced off of their land as the mining operations of a local coal and anthracite mine branch out over the landscape. The image shows rural homes in the left bottom corner across a small road from a dark black mass, which is the coal mine (Mazzuca 2017). This print illustrates an overlapping of degraded and toxic landscapes with lived spaces where communities exist. The layering of these images over one another creates a sense of disruption, which echoes the disruption of the landscape and the communities surrounding the mine.

Figure 6.14 Eloff Pretorius, *Aftermath* (2018) Photopolymer, aquatint, etching and drypoint, photographed by Eloff Pretorius (2018)

6.4 Summary

Through a systematic process of testing new materials and recording these tests in the form of printed works, I was able to identify a variety of materials and processes that could be used to create the aesthetics associated with traditional materials as well as introduce new visual characteristics that expand the visual possibilities of etching. Depicting toxicity and chemical waste in the subject matter of these prints was a response to the scientific nature of the data gathered by researching chemical hazards and alternative materials. The landscapes in these prints connect the works to mining industry and acknowledge copper plate etching's connection to mining. The use of multiple perspectives to depict these landscape uses an orbital vantage point to identify instances of human impact on the South African landscape and on the earth system.

CHAPTER 7: CONCLUSION

7. Conclusion

This research analysed the printmaking methods, comprised of materials and processes, used as non-toxic alternatives to traditional printmaking methods. By framing the intaglio printmaking medium within a general systems framework, a practice-based method was applied to test and analyse the elements that comprise the intaglio printmaking process. Alternative methods found in the literature, observed and practiced at the Academy in Ghent, and tested at the Centre for Visual Arts, culminated in the body of printed artworks and the *Disruption* exhibition. To conclude the dissertation, I will reflect on the research questions laid out in the introduction and discuss my findings with regards to these questions.

7.1 Non-toxic printmaking at the Academy for Visual Art in Ghent

The central research component of this dissertation was based on my time in Ghent. I was immersed in the Ghentian culture for three months and conducted a case study to understand the nature of non-toxic printmaking at the Academy for Visual Arts in Ghent. I actively participated in non-toxic printmaking practice and evaluated the quality of the aesthetic results these practices produce, finding them to accurately replicate the aesthetics of traditional printmaking practice while giving the printmaker increased control and freedom in the creative processes. Marnix Everaert and his colleagues have established a framework for safe practice that tests new materials, then systematically considers each material and processes available in the printmaking system and seeks out the safest accessible option. The students at the Academy in Ghent are well-educated as to the characteristics of the materials that they use. Hazardous materials, such as ferric chloride, are always stored in labelled containers with material safety data sheets attached. Practical steps like these ensure that in the case of an emergency, there is sufficient information for students and staff to quickly identify the hazard and respond appropriately. The studio space at the Academy was a very busy printmaking environment with a large number of students working on a variety of individual printmaking projects in a limited space. The studio remained clean and organised during these busy classes, because students made sure to work efficiently within the space and clean the working surfaces after they had finished.

In analysing the Academy in Ghent, it became clear that Everaert's decision to work with non-toxic materials and to make sure that the non-toxic alternatives truly are as good as or better than traditional materials, was the driving factor that shaped the printmaking practice at the Academy. His decades-long process of trial-and-error research has cumulated in an

academic studio where non-toxic printmaking has wholly replaced traditional printmaking. Everaert's willingness to share his experience and methods with printmakers like myself allows other studios to achieve a similar non-toxic practice in their different contexts without such a long period of trial-and-error research. By applying the principles that Everaert's research has established and finding local alternatives to materials that are inaccessible, printmaking studios like the CVA can improve the safety and quality of intaglio printmaking. I found that the culture of experimentation established by Everaert's non-toxic research was carried over into the culture of the students. Everaert's approach enabled students to continually seek out new methods to create images, rather than utilising a traditional method exclusively. The safety of the studio infrastructure and non-toxic materials allowed this culture to form, as there were fewer hazards for students to navigate. This study found non-toxic etching processes at the Academy in Ghent to be very safe. I concluded that creative image-making processes benefitted from safer working spaces, because of the reduced hazards in the processes of artistic practice.

7.2 Intaglio printmaking practice at the CVA

Intaglio printmaking practice at the Centre for Visual Arts has historically been centred on traditional materials and processes. The studio has a large supply of materials and well-established infrastructure for traditional intaglio, and the use of these materials is currently more familiar to printmakers at the studio. Of the three printmaking processes most commonly practiced at the CVA, etching remains the primary source of hazardous chemicals in the studio. The CVA has already transitioned to solvent-free water-based silkscreening, and the introduction of non-toxic materials over the last two years has built on this transition.

Printmaking practice at the CVA has been in a transformative phase due to a high turn-over of printmaking staff in the last decade, which has left the studio without a consistent printmaking presence. In this absence, knowledge and expertise could not be generated and transferred to students consistently. This may be a contributing factor to the small number of postgraduate printmaking students and a scarcity of printmaking expertise in the department. Through this research and the workshop with Everaert at the Caversham Press, non-toxic intaglio has been introduced to the CVA as an accessible option for the department to work towards. Rather than continuing with traditional printmaking practice, which may still be the easier intaglio method to use, the CVA has an opportunity to continue utilising the non-toxic practices that have been introduced through this research, and establish itself as a non-toxic studio.

7.3 Comparison of the two studios

The CVA has infrastructure established for traditional intaglio printmaking processes, while the Academy in Ghent's infrastructure has been built up through Everaert's non-toxic research. While it would be very challenging to conduct traditional printmaking at the Academy in Ghent, the CVA can currently facilitate both traditional and non-toxic approaches to intaglio printmaking. A staff member at the CVA may have to take on the challenge of implementing the findings of this research in future classes in order to make a complete transition to non-toxic intaglio in the studio. Currently the CVA has the infrastructure and materials to switch to a non-toxic mordant, acrylic aquatint, and acrylic hard ground. It was my hope that this research would present non-toxic practice in such a way that it is easy to adopt. The CVA also has the infrastructure to teach photopolymer film techniques, which could create new opportunities for students interested in both intaglio printmaking and digital arts.

Within the context of undergraduate classes at the CVA, I believe that making non-toxic intaglio available to students will improve their experience and reduce the potential for accidents and injuries in the studio. When students are not given an option to avoid hazardous processes, the risks that they are exposed to are undertaken involuntarily. It is important that students are aware of the hazards involved in intaglio and that these hazards are minimised by implementing safe working practices and materials. At a research institution like the CVA, with a history of traditional intaglio, it may also be valuable to keep the traditional infrastructure available to senior students who want to work with traditional intaglio processes. A knowledgeable senior student with an understanding of the hazards of traditional printmaking could still practice traditional printmaking on a smaller and safer scale. Within such a context, precautions should be taken to improve the storage, use, and disposal of hazardous materials. Figures 6.3, 6.4 and 6.5 compare the chemical properties of materials and their storage compatibility to help printmakers identify incompatible chemicals and prevent them from being stored together.

7.4 Exploring environmental concerns in the South African landscape

Practice-based research guided the evolution of my subject matter and early test pieces focused on the themes of landscape and perspective. Copper etching is connected to the landscape, as copper is extracted from the land by mining. This body of work would not exist without the mining processes that produce copper etching plates. The characteristics of mining as a process where a surface is dug into and changed is mirrored in the etching process, which digs into the plate surface and reshapes it to create an image. The connections

I perceived between etching and mining influenced my exploration of the South African landscape to find examples of environmental degradation related to mining activities. Mined landscapes are scars in the earth's surface that continue to influence the environments around them. The use of non-toxic materials to depict mined landscapes draws attention to the state of these landscapes where toxic chemicals are continuously released in the form of acid mine drainage, which changes the water, soil and ecology of the landscape. Mines are visual indicators of the effect that human activity is having in South Africa and within the earth system.

These mines are part of a system of human activity that is rapidly altering the earth system. The use of orbital perspective contextualises the mined landscapes as parts of a global system and reorients them so that they become two-dimensional forms that function as visual intrusions in the landscapes depicted in the printed works. The geometric shapes of these mines allude to their man-made nature. These forms break the traditional rectangular format of a landscape etching. They extend out into the surrounding page and overlap the boundary of the landscape format, existing within the perimeters of the landscape and outside. The non-toxic printmaking methods used to create this body of printed works exist within the aesthetic tradition but outside of the traditional method. This visual disruption echoes the nature of my research, which seeks to change a traditional approach to etching by introducing new technologies to an ancient art form. Using non-toxic materials to create these images is a step towards safer practice that represents the broader need for human activities to change in ways that are less hazardous and have a reduced environmental impact on the earth system.

7.5 Suggestions for further research

It is possible that there are better alternative materials available in South Africa but that the time constraint on this research prevented them from being tested. Further testing of other acrylic mediums, heatset inks, and soft ground materials could reveal more accessible and effective materials. In addition, a quantitative assessment of printmaking studios in South Africa would establish the prevalence of non-toxic methods in the country and could be used to compare the practices and safety standards at various printmaking studios.

7.6 Closing statement

The introduction of advances in non-toxic printmaking at the CVA has led me to gain a deeper understanding of the nature of traditional intaglio aesthetics, the chemistry of intaglio processes, and the advantages of non-toxic practice. While finding some materials and using

them properly was challenging, the increased studio safety benefited my practice by removing many of the hazards I had worked with in traditional printmaking methods. Some non-toxic techniques like airbrush aquatint give the printmaker more control and variety over the processes, and photopolymer intaglio-type has allowed me to incorporate digital imagery into my intaglio practice. Non-toxic intaglio printmaking rejects the traditional materials that are harmful to the printmaker without losing any of the valued aesthetics that so many artists throughout history have incorporated into their work.

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Appendix A

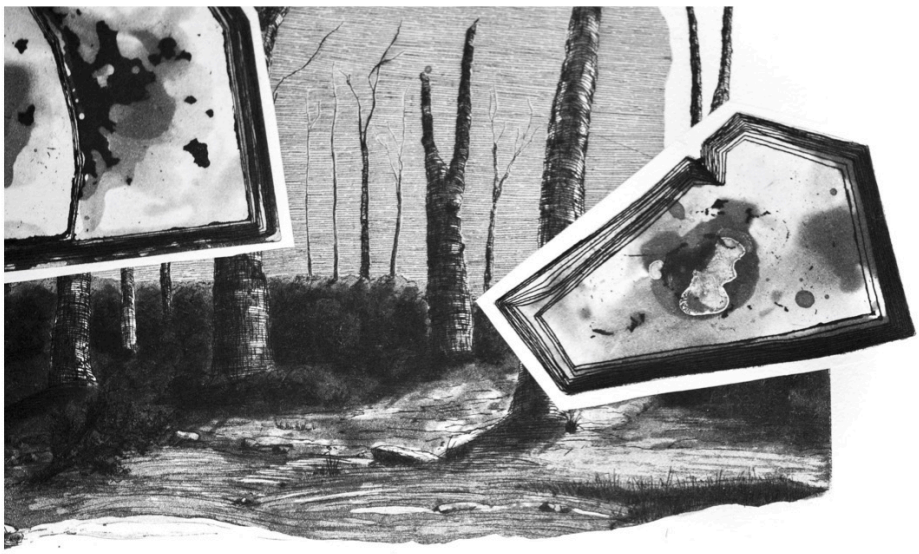
Interview questions for Marnix Everaert

1. What was your motivation for working with non-toxic materials?
2. Were you a student or a working artist when you made the transition?
3. What role did personal risk perception play in your decision making?
4. How did this transition impact your work both aesthetically and conceptually?
5. According to Michael McCann, “Art teachers are responsible not only for their own health, but also for safeguarding the health of their students” (McCann 2001). What are your thoughts on this statement?
6. John Pengelly states that “individual artists are willing to accept surprisingly high levels of risk… provided that the risks are self imposed and that the consequences lie many years ahead" (Pengelly 1997). Many of the harmful chemicals used in traditional printmaking take a long time to affect the artist’s health. How would you teach younger students to be mindful of these effects?
7. What role do you think artists can play in improving risk awareness in society?
8. How does the global narrative of environmental degradation and risk impact your work as an artist?
9. How do you minimise waste production in your studio?
10. It seems that non-toxic printmaking is not simply about using alternative materials, but also about understanding our relationship with our global environment. What kind of conceptual shift, if any, do you think is necessary to encourage artists to create safer working spaces with minimal environmental impact?

Appendix B

***Disruption* exhibition catalogue**

DISRUPTION



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2

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Eloff Pretorius

Disruption

2018

Catalogue

This exhibition is in partial fulfilment of the research project,
Introducing Advances In Non-toxic Intaglio Printmaking At The Centre For Visual Arts UKZN Through Practice Based Research by Eloff Pretorius
as part of a Masters in Fine Art.

Artist's Statement

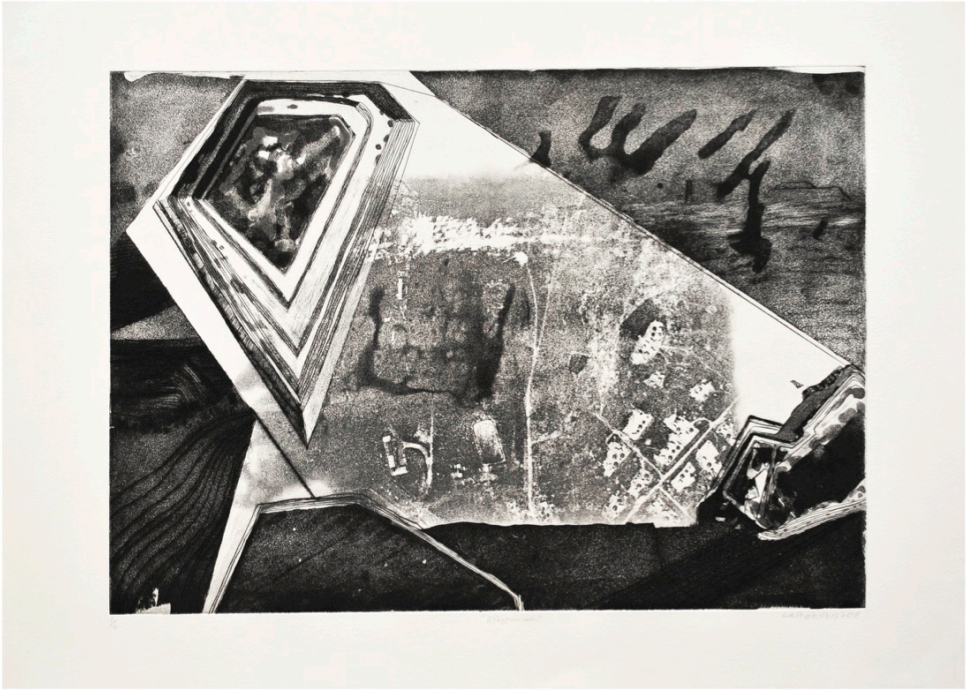
This exhibition explores the visual characteristics of non-toxic intaglio printmaking materials and processes. Etching and intaglio have well-established visual aesthetics which were developed by master printmakers in the 16th and 17th century. These characteristics were achieved with a specific set of materials and processes that have remained largely the same in over the years. A number of artists concerned with health in the arts recently began researching and working with alternative etching methods in order to reduce the hazards in the etching studio.

My research involved a three-month case study in Belgium, where I learnt a series of alternative etching methods that minimize hazards in the studio. Following this case study, I returned to South Africa to begin testing locally-sourced materials and systems at the CVA. I was able to identify a variety of alternative methods that could be used to re-create the aesthetics associated with traditional etching methods. The new materials, such as acrylic grounds and photopolymer, also allowed me to introduce new visual characteristics into the work and expand the visual possibilities of etching and intaglio at the CVA. This body of art work was created in Belgium and South Africa through the research process.

The subject matter in this series of works is centred on specific landscapes in South Africa where human activity has changed the form, ecology and chemistry of the land. Satellite imagery of South Africa was used to identify a series of mined landscapes that stand out as scars on the earth's surface. The most notable and recursive of these were mining landscapes. The large dumps made up of coloured chemicals and strange shapes were indicators of extractive industry, which has reshaped South Africa economically, culturally and physically. Realizing that copper plate etching was directly reliant on this extractive industry, I visited some of the sites and documented the scenery to gather reference images exploring disrupted spaces. Elements such as the vast layered mounds of fine sand, dramatic erosion and colourful chemical waste were indicators of the lasting impacts of human activity.

Viewing these landscapes from an orbital perspective shows the natural landscape disrupted suddenly and brutally by sharp geometric forms. These forms appear superimposed over the surrounding vegetation, rural communities or urban grids and form a scattered mosaic of fragmented land. Depicting landscapes from an orbital perspective abstracts them by removing the horizon line and turning them into two-dimensional images with no relatable sense of depth or scale. In some of the prints, copper plates shaped like the geometric mine dumps break out of the traditional rectangular format of a landscape etching. They disrupt the format and extend out into the surrounding space. These intrusions thus exist within the landscape and outside of it. So also the non-toxic printmaking methods used to create this body of works exists within the aesthetic tradition, but outside of the traditional method. Thematically, this disruption echoes the nature of my research, which seeks to change the traditional approach to etching by introducing new technologies to a old art form.

6



'Aftermath' 2018
Etching, aquatint, drypoint and photopolymer
54 x 38cm

7

'Corrosion' 2018
Etching, aquatint and drypoint
54 x 38cm

8

'Disruption' 2018
Etching and aquatint
54 x 38cm

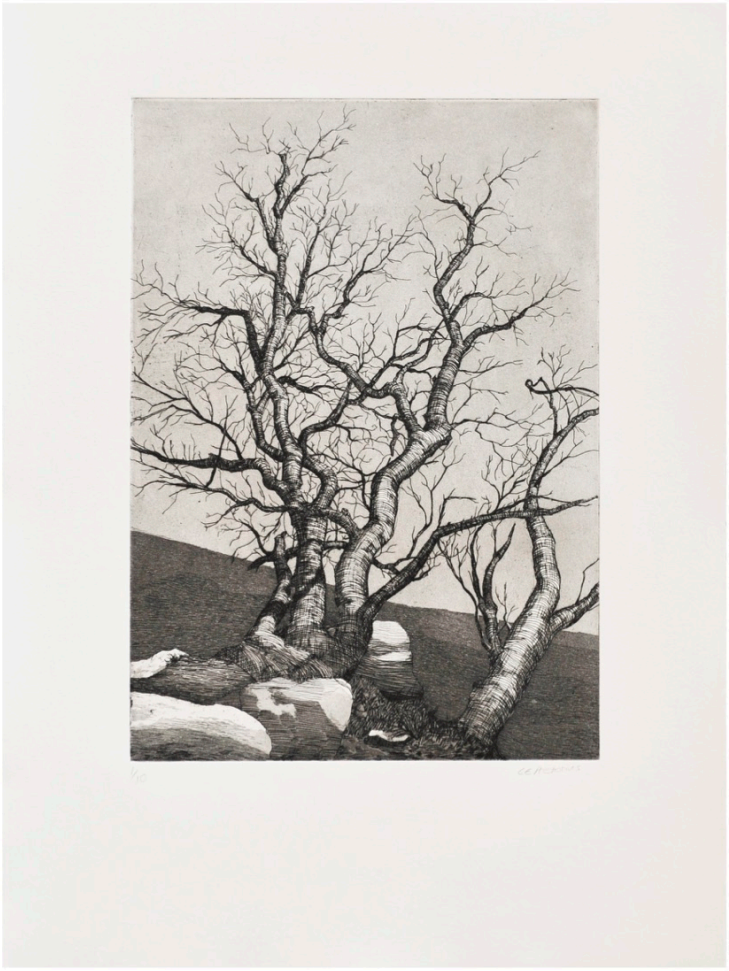
9

'Intrusion' 2018
Etching and aquatint
54 x 38cm

10

Untitled I 2018
Etching and aquatint
19 x 27cm

11



Untitled II 2018
Etching and aquatint
19 x 27cm

12

Untitled III 2018
Etching, aquatint and Lazy Mezzotint
19 x 27cm

13

Untitled IV 2018
Soft ground etching
27 x 19cm

14

Untitled V 2018
Etching, aquatint and Lazy Mezzotint
27 x 19cm

15

'Environmental Aesthetics' 2017
Etching
50 x 70cm

16

'Stormscape' 2017
Etching
20 x 30cm

17

Untitled VI 2018
Etching and aquatint
27 x 19cm

18

'Mining Overview' 2018
Etching
50 x 35cm

19

'Intrusion' AP 2018
Etching and Chine Colle
54 x 38cm

20

'Diversion' 2018
Soft ground etching
19 x 27cm

21

'Rooidam' 2017
Etching
50 x 35cm

22

'Acid Mine Drainage II' 2018
Photopolymer Intaglio-type
27 x 19cm

23

Untitled VII 2018
Photopolymer Intaglio-type
27 x 19cm

24

Untitled VIII 2018
Photopolymer Intaglio-type
27 x 19cm

25

'Acid Mine Drainage I' 2018
Photopolymer Intaglio-type
27 x 19cm

26

‘Acid Mine Drainage III’ 2018
Photopolymer Intaglio-type
27 x 19cm

27

Untitled IX 2018
Photopolymer Intaglio-type
27 x 19cm

28

Appendix C

Ethical clearance letter

24 November 2017

Mr Casparus Eloff Pretorius 212535538
School of Arts
Pietermaritzburg Campus

Dear Mr Pretorius

Protocol reference number: HSS/2193/017M
Project title: Introducing advances in non-toxic Intaglio Printmaking At The Centre For Visual Arts UKZN through practice based research

FULL APPROVAL – No Risk/Exemption Application

In response to your application received 17 November 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....

Dr Shamila Naidoo (Deputy Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

cc Supervisor: Dr Kathy Arbuckle
cc. Academic Leader Research: Dr Sandra Pitcher
cc. School Administrator: Ms Debbie Bowen

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** ximbap@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za